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APPENDICES

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Appendix

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DRAFT ENVIRONMENTAL IMPACT REPORT

KINGSTON BEDFORD ESSEX STREET

DEVELOPMENT

EOEA NO. 6132

City Of Boston
Raymond L. Flynn
Mayor

Boston
Redevelopment
Authority
Stephen Coyle
Director

March1989

BOSTON
PUBLIC
LIBRARY

KINGSTON-BEDFORD-ESSEX STREET DEVELOPMENT

EOEA NO. 6132

DRAFT ENVIRONMENTAL IMPACT REPORT

Technical Appendix B
(Transportation & Traffic Data)

Submitted by

BOSTON REDEVELOPMENT AUTHORITY

Boston, Massachusetts

April 1989

City of Boston
Raymond L. Flynn
Mayor

Boston Redevelopment Authority
Joseph J. Walsh, Vice Chairman
Michael F. Donlan, Vice Chairman, Subcommittees
James K. Flaherty, Treasurer
Clarence J. Jones, Assistant Treasurer
Francis X. O'Brien, Member
Kane Simonian, Secretary
Stephen Coyle, Director

Appendix B: Transportation and Traffic Data

1. Automobile Traffic Recorder Count Summaries
2. Intersection Turning Movement Count Summaries
3. Level of Service Calculations
4. MBTA Correspondence Regarding Transit Capacity
5. Person Trip Rates and Modal Split Calculations for Development Options
6. MBTA Correspondence Regarding Proposed Essex Street Tunnel

APPENDIX B-1

AUTOMATIC TRAFFIC RECORDER COUNT SUMMARIES

- Lincoln, north of Essex
- Bedford, east of Kingston
- Kingston, north of Essex
- Essex, east of Kingston

SASAKI ASSOCIATES, INC.
15 MINUTE, 1 CHANNEL VEHICLE COUNT
COUNT RATIO: 1.00

SITE NO.: 6367.01
FILE: 6367LNE
LINCOLN NORTH OF ESSEX NORTHBOUND
WEEK OF MONDAY SEPTEMBER 15, 1996

HOUR BEGINS	MONDAY 15		TUESDAY 16		WEDNESDAY 17		THURSDAY 18		FRIDAY 19		WEEKDAY AVERAGE		SATURDAY 20		SUNDAY 21		7 DAY AVERAGE	
12:00	*		*		*		*		19		19		23		39		27	
12:15	*		*		*		*		19		19		18		37		25	
12:30	*		*		*		*		14		14		26		17		19	
12:45	*	0	*	0	*	0	*	0	14	66	14	66	20	87	12	105	15	86
1:00	*		*		*		*		10		10		12		18		13	
1:15	*		*		*		*		4		4		22		18		15	
1:30	*		*		*		*		3		3		5		11		6	
1:45	*	0	*	0	*	0	*	0	7	24	7	24	10	49	14	61	10	45
2:00	*		*		*		*		5		5		9		12		9	
2:15	*		*		*		*		7		7		13		23		14	
2:30	*		*		*		*		7		7		15		9		10	
2:45	*	0	*	0	*	0	*	0	4	23	4	23	12	49	8	52	8	41
3:00	*		*		*		*		11		11		9		3		8	
3:15	*		*		*		*		6		6		10		11		9	
3:30	*		*		*		*		4		4		4		2		3	
3:45	*	0	*	0	*	0	*	0	2	23	2	23	12	35	2	18	5	25
4:00	*		*		*		*		6		6		7		7		7	
4:15	*		*		*		*		7		7		3		2		4	
4:30	*		*		*		*		7		7		5		4		5	
4:45	*	0	*	0	*	0	*	0	10	30	10	30	4	19	*	13	7	23
5:00	*		*		*		*		11		11		5		*		8	
5:15	*		*		*		*		13		13		2		*		8	
5:30	*		*		*		*		14		14		16		*		15	
5:45	*	0	*	0	*	0	*	0	7	45	7	45	22	45	*	0	15	45
6:00	*		*		*		*		52		52		19		*		36	
6:15	*		*		*		*		52		52		15		*		34	
6:30	*		*		*		*		77		77		24		*		51	
6:45	*	0	*	0	*	0	*	0	84	265	84	265	41	99	*	0	63	182
7:00	*		*		*		*		122		122		41		*		82	
7:15	*		*		*		*		139		139		31		*		85	
7:30	*		*		*		*		173		173		37		*		105	
7:45	*	0	*	0	*	0	*	0	199	633	199	633	52	161	*	0	126	397
8:00	*		*		*		*		171		171		62		*		117	
8:15	*		*		*		*		163		163		74		*		119	
8:30	*		*		*		*		208		208		77		*		143	
8:45	*	0	*	0	*	0	*	0	195	737	195	737	79	292	*	0	137	515
9:00	*		*		*		*		112		112		83		*		98	
9:15	*		*		*		*		176		176		129		*		153	
9:30	*		*		*		*		147		147		99		*		123	
9:45	*	0	*	0	*	0	*	0	119	554	119	554	83	394	*	0	101	474
10:00	*		*		*		*		147		147		99		*		123	
10:15	*		*		*		*		99		99		99		*		99	
10:30	*		*		*		*		119		119		114		*		117	
10:45	*	0	*	0	*	0	*	0	118	483	118	483	87	399	*	0	103	441
11:00	*		*		*		*		135		135		97		*		116	
11:15	*		*		*		*		98		98		106		*		102	
11:30	*		*		*		*		115		115		93		*		104	
11:45	*	0	*	0	*	0	*	0	114	462	114	462	101	397	*	0	108	430
AM TOTALS		0		0		0		0		3345		3345		2026		249		2703
PEAK HOUR BEGINS		*		*		*		*		7:45		7:45		9:15		12:00		8:30
VOLUME		*		*		*		*		741		741		410		105		531
PHF		*		*		*		*		0.89		0.89		0.79		0.67		0.87

SASAKI ASSOCIATES, INC.
15 MINUTE, 1 CHANNEL VEHICLE COUNT
COUNT RATIO: 1.00

SITE NO.: 6367.01
LINCOLN NORTH OF ESSEX NORTHBOUND
WEEK OF MONDAY SEPTEMBER 15, 1986

FILE: 6367LNE

HOUR BEGINS	MONDAY 15		TUESDAY 16		WEDNESDAY 17		THURSDAY 18		FRIDAY 19		WEEKDAY AVERAGE		SATURDAY 20		SUNDAY 21		7 DAY AVERAGE	
12:00	*		*		*		*		113		113		93		*		103	
12:15	*		*		*		*		133		133		93		*		113	
12:30	*		*		*		*		106		106		96		*		101	
12:45	*	0	*	0	*	0	*	0	109	461	109	461	89	371	*	0	99	416
1:00	*		*		*		*		116		116		95		*		106	
1:15	*		*		*		*		98		98		109		*		104	
1:30	*		*		*		*		109		109		89		*		99	
1:45	*	0	*	0	*	0	*	0	87	410	87	410	109	402	*	0	98	406
2:00	*		*		*		*		83		83		83		*		83	
2:15	*		*		*		*		154		154		97		*		126	
2:30	*		*		*		*		124		124		68		*		96	
2:45	*	0	*	0	*	0	*	0	124	485	124	485	82	330	*	0	103	408
3:00	*		*		*		*		122		122		82		*		102	
3:15	*		*		*		*		129		129		82		*		106	
3:30	*		*		*		*		118		118		86		*		102	
3:45	*	0	*	0	*	0	*	0	92	461	92	461	105	355	*	0	99	408
4:00	*		*		*		*		133		133		79		*		106	
4:15	*		*		*		99		118		109		83		*		100	
4:30	*		*		*		154		119		137		72		*		115	
4:45	*	0	*	0	*	0	102	355	120	490	111	489	69	303	*	0	97	418
5:00	*		*		*		112		111		112		76		*		100	
5:15	*		*		*		111		124		118		71		*		102	
5:30	*		*		*		114		115		115		68		*		99	
5:45	*	0	*	0	*	0	115	452	101	451	108	452	63	278	*	0	93	394
6:00	*		*		*		110		80		95		61		*		84	
6:15	*		*		*		104		99		102		65		*		89	
6:30	*		*		*		97		76		87		42		*		72	
6:45	*	0	*	0	*	0	78	389	72	327	75	358	47	215	*	0	66	310
7:00	*		*		*		81		72		77		39		*		64	
7:15	*		*		*		64		56		60		43		*		54	
7:30	*		*		*		46		62		54		43		*		50	
7:45	*	0	*	0	*	0	43	234	55	245	49	240	38	163	*	0	45	214
8:00	*		*		*		60		44		52		32		*		45	
8:15	*		*		*		37		32		35		23		*		31	
8:30	*		*		*		33		63		48		28		*		41	
8:45	*	0	*	0	*	0	32	162	54	193	43	178	23	106	*	0	36	154
9:00	*		*		*		27		49		38		30		*		35	
9:15	*		*		*		19		51		35		24		*		31	
9:30	*		*		*		29		44		37		19		*		31	
9:45	*	0	*	0	*	0	23	98	38	182	31	140	15	88	*	0	25	123
10:00	*		*		*		23		25		24		30		*		26	
10:15	*		*		*		21		23		22		24		*		23	
10:30	*		*		*		30		35		33		12		*		26	
10:45	*	0	*	0	*	0	37	111	37	120	37	116	41	107	*	0	38	113
11:00	*		*		*		24		15		20		33		*		24	
11:15	*		*		*		23		26		25		35		*		28	
11:30	*		*		*		14		33		24		33		*		27	
11:45	*	0	*	0	*	0	22	83	30	104	26	94	31	132	*	0	28	106
PM TOTALS		0		0		0		1884		3929		3882		2850		0		3469
PEAK HOUR BEGINS		*		*		*		4:30		2:15		2:15		1:00		*		2:15
VOLUME		*		*		*		479		524		524		402		*		427
PHF		*		*		*		0.73		0.85		0.85		0.92		*		0.85

SASAKI ASSOCIATES, INC.
15 MINUTE, 1 CHANNEL VEHICLE COUNT
COUNT RATIO: 1.00

SITE NO.: 6367.01 FILE: 6367BEXU
BEDFORD E. OF KINGSTON WESTBOUND
WEEK OF MONDAY SEPTEMBER 15, 1986

HOUR BEGINS	MONDAY 15		TUESDAY 16		WEDNESDAY 17		THURSDAY 18		FRIDAY 19		WEEKDAY AVERAGE		SATURDAY 20		SUNDAY 21		7 DAY AVERAGE	
12:00	*		*		*		*		16		16		29		26		24	
12:15	*		*		*		*		15		15		25		16		19	
12:30	*		*		*		*		9		9		16		15		13	
12:45	*	0	*	0	*	0	*	0	5	45	5	45	10	80	12	69	9	65
1:00	*		*		*		*		9		9		8		11		9	
1:15	*		*		*		*		4		4		19		15		13	
1:30	*		*		*		*		9		9		6		10		8	
1:45	*	0	*	0	*	0	*	0	3	25	3	25	10	43	8	44	7	37
2:00	*		*		*		*		6		6		9		7		7	
2:15	*		*		*		*		3		3		9		13		8	
2:30	*		*		*		*		1		1		14		9		8	
2:45	*	0	*	0	*	0	*	0	8	18	8	18	11	43	7	36	9	32
3:00	*		*		*		*		6		6		6		11		8	
3:15	*		*		*		*		2		2		4		4		3	
3:30	*		*		*		*		2		2		4		4		3	
3:45	*	0	*	0	*	0	*	0	1	11	1	11	3	17	4	23	3	17
4:00	*		*		*		*		6		6		3		4		4	
4:15	*		*		*		*		0		*		1		1		1	
4:30	*		*		*		*		2		2		7		7		5	
4:45	*	0	*	0	*	0	*	0	3	11	3	11	2	13	1	13	2	13
5:00	*		*		*		*		6		6		3		1		3	
5:15	*		*		*		*		3		3		2		3		3	
5:30	*		*		*		*		6		6		4		5		5	
5:45	*	0	*	0	*	0	*	0	6	21	6	21	11	20	3	12	7	18
6:00	*		*		*		*		18		18		10		7		12	
6:15	*		*		*		*		22		22		7		7		12	
6:30	*		*		*		*		31		31		14		6		17	
6:45	*	0	*	0	*	0	*	0	29	100	29	100	16	47	8	28	18	58
7:00	*		*		*		*		48		48		22		10		27	
7:15	*		*		*		*		61		61		17		5		23	
7:30	*		*		*		*		75		75		24		21		40	
7:45	*	0	*	0	*	0	*	0	121	305	121	305	38	101	5	41	55	149
8:00	*		*		*		*		108		108		46		*		77	
8:15	*		*		*		*		100		100		55		*		78	
8:30	*		*		*		*		127		127		36		*		82	
8:45	*	0	*	0	*	0	*	0	120	455	120	455	62	199	*	0	91	327
9:00	*		*		*		*		107		107		46		*		77	
9:15	*		*		*		*		92		92		53		*		73	
9:30	*		*		*		*		99		99		80		*		90	
9:45	*	0	*	0	*	0	*	0	103	401	103	401	45	224	*	0	74	313
10:00	*		*		*		*		98		98		78		*		88	
10:15	*		*		*		*		91		91		60		*		76	
10:30	*		*		*		*		97		97		73		*		85	
10:45	*	0	*	0	*	0	*	0	76	362	76	362	55	266	*	0	66	314
11:00	*		*		*		*		76		76		48		*		62	
11:15	*		*		*		*		74		74		56		*		65	
11:30	*		*		*		*		92		92		58		*		75	
11:45	*	0	*	0	*	0	*	0	71	313	71	313	71	233	*	0	71	273
AM TOTALS		0		0		0		0		2067		2067		1286		266		1616
PEAK HOUR BEGINS		*		*		*		*		7:45		7:45		10:00		12:00		8:45
VOLUME		*		*		*		*		456		456		266		69		331
PHF		*		*		*		*		0.90		0.90		0.85		0.66		0.91

SASAKI ASSOCIATES, INC.
15 MINUTE, 1 CHANNEL VEHICLE COUNT
COUNT RATIO: 1.00

SITE NO.: 6367.01 FILE: 63678EXU
BEDFORD E. OF KINGSTON WESTBOUND
WEEK OF MONDAY SEPTEMBER 15, 1986

HOUR BEGINS	MONDAY 15		TUESDAY 16		WEDNESDAY 17		THURSDAY 18		FRIDAY 19		WEEKDAY AVERAGE		SATURDAY 20		SUNDAY 21		7 DAY AVERAGE	
12:00	*		*		*		*		83		83		57		*		70	
12:15	*		*		*		*		80		80		60		*		70	
12:30	*		*		*		*		64		64		77		*		71	
12:45	*	0	*	0	*	0	*	0	82	309	82	309	59	253	*	0	71	281
1:00	*		*		*		*		91		91		70		*		81	
1:15	*		*		*		*		83		83		77		*		80	
1:30	*		*		*		*		68		68		78		*		73	
1:45	*	0	*	0	*	0	*	0	61	303	61	303	67	292	*	0	64	298
2:00	*		*		*		*		49		49		47		*		48	
2:15	*		*		*		*		71		71		76		*		74	
2:30	*		*		*		*		44		44		69		*		57	
2:45	*	0	*	0	*	0	*	0	51	215	51	215	63	255	*	0	57	235
3:00	*		*		*		*		66		66		75		*		71	
3:15	*		*		*		*		54		54		67		*		61	
3:30	*		*		*		*		61		61		58		*		60	
3:45	*	0	*	0	*	0	48	48	42	223	45	226	51	251	*	0	47	238
4:00	*		*		*		52		53		53		51		*		52	
4:15	*		*		*		37		44		41		51		*		44	
4:30	*		*		*		61		65		63		49		*		58	
4:45	*	0	*	0	*	0	57	207	51	213	54	210	46	197	*	0	51	206
5:00	*		*		*		71		52		62		35		*		53	
5:15	*		*		*		70		57		64		42		*		56	
5:30	*		*		*		53		34		44		34		*		40	
5:45	*	0	*	0	*	0	54	248	60	203	57	226	50	161	*	0	55	204
6:00	*		*		*		59		33		49		37		*		45	
6:15	*		*		*		42		37		40		48		*		42	
6:30	*		*		*		46		44		45		31		*		40	
6:45	*	0	*	0	*	0	41	188	34	154	38	171	35	151	*	0	37	164
7:00	*		*		*		51		35		43		27		*		38	
7:15	*		*		*		50		30		40		24		*		35	
7:30	*		*		*		35		36		36		34		*		35	
7:45	*	0	*	0	*	0	37	173	50	151	44	162	24	109	*	0	37	144
8:00	*		*		*		39		24		32		31		*		31	
8:15	*		*		*		23		26		25		19		*		23	
8:30	*		*		*		32		30		31		18		*		27	
8:45	*	0	*	0	*	0	22	116	32	112	27	114	22	90	*	0	25	106
9:00	*		*		*		25		31		28		20		*		25	
9:15	*		*		*		17		22		20		22		*		20	
9:30	*		*		*		21		23		22		18		*		21	
9:45	*	0	*	0	*	0	21	84	24	100	23	92	15	75	*	0	20	86
10:00	*		*		*		23		27		25		27		*		26	
10:15	*		*		*		29		23		26		20		*		24	
10:30	*		*		*		21		35		28		16		*		24	
10:45	*	0	*	0	*	0	22	95	28	113	25	104	20	83	*	0	23	97
11:00	*		*		*		19		22		21		16		*		19	
11:15	*		*		*		15		35		25		12		*		21	
11:30	*		*		*		12		32		22		27		*		24	
11:45	*	0	*	0	*	0	10	56	29	118	20	87	23	78	*	0	21	84
PM TOTALS		0		0		0		1215		2214		2219		1995		0		2143
PEAK HOUR BEGINS		*		*		*		4:30		12:45		12:45		1:00		*		12:45
VOLUME		*		*		*		259		324		324		292		*		305
PHF		*		*		*		0.91		0.89		0.89		0.94		*		0.94

SASAKI ASSOCIATES, INC.
15 MINUTE, 1 CHANNEL VEHICLE COUNT
COUNT RATIO: 1.00

SITE NO.: 6367.01 FILE: 6367KHES
KINGSTON NORTH OF ESSEX SOUTHBOUND
WEEK OF MONDAY SEPTEMBER 8, 1986

HOUR BEGINS	MONDAY 8		TUESDAY 9		WEDNESDAY 10		THURSDAY 11		FRIDAY 12		WEEKDAY AVERAGE		SATURDAY 13		SUNDAY 14		7 DAY AVERAGE	
12:00	*		*		*		*		*		*		35		27		31	
12:15	*		*		*		*		*		*		40		19		30	
12:30	*		*		*		*		*		*		23		13		18	
12:45	*	0	*	0	*	0	*	0	*	0	*	0	33	131	26	85	30	108
1:00	*		*		*		*		*		*		27		4		16	
1:15	*		*		*		*		*		*		22		14		18	
1:30	*		*		*		*		*		*		17		15		16	
1:45	*	0	*	0	*	0	*	0	*	0	*	0	18	84	10	43	14	64
2:00	*		*		*		*		*		*		22		17		20	
2:15	*		*		*		*		*		*		42		16		29	
2:30	*		*		*		*		*		*		38		21		30	
2:45	*	0	*	0	*	0	*	0	*	0	*	0	24	126	16	70	20	98
3:00	*		*		*		*		*		*		8		6		7	
3:15	*		*		*		*		*		*		7		10		9	
3:30	*		*		*		*		*		*		6		8		7	
3:45	*	0	*	0	*	0	*	0	*	0	*	0	7	28	2	26	5	27
4:00	*		*		*		*		*		*		10		1		6	
4:15	*		*		*		*		*		*		6		2		4	
4:30	*		*		*		*		*		*		2		3		3	
4:45	*	0	*	0	*	0	*	0	*	0	*	0	1	19	4	10	3	15
5:00	*		*		*		*		*		*		2		4		3	
5:15	*		*		*		*		*		*		3		1		2	
5:30	*		*		*		*		*		*		5		4		5	
5:45	*	0	*	0	*	0	*	0	*	0	*	0	2	12	3	12	3	12
6:00	*		*		*		*		*		*		3		4		4	
6:15	*		*		*		*		*		*		6		5		6	
6:30	*		*		*		*		*		*		19		18		19	
6:45	*	0	*	0	*	0	*	0	*	0	*	0	14	42	22	49	18	46
7:00	*		*		*		*		*		*		15		*		15	
7:15	*		*		*		*		*		*		8		*		8	
7:30	*		*		*		*		*		*		29		*		29	
7:45	*	0	*	0	*	0	*	0	*	0	*	0	12	64	*	0	12	64
8:00	*		*		*		*		*		*		26		*		26	
8:15	*		*		*		*		*		*		37		*		37	
8:30	*		*		*		*		*		*		38		*		38	
8:45	*	0	*	0	*	0	*	0	*	0	*	0	44	145	*	0	44	145
9:00	*		*		*		*		*		*		52		*		52	
9:15	*		*		*		*		*		*		35		*		35	
9:30	*		*		*		*		*		*		76		*		76	
9:45	*	0	*	0	*	0	*	0	*	0	*	0	66	229	*	0	66	229
10:00	*		*		*		*		*		*		57		*		57	
10:15	*		*		*		*		*		*		51		*		51	
10:30	*		*		*		*		*		*		89		*		89	
10:45	*	0	*	0	*	0	*	0	*	0	*	0	90	287	*	0	90	287
11:00	*		*		*		*		*		*		90		*		90	
11:15	*		*		*		*		*		*		95		*		95	
11:30	*		*		*		*		*		*		100		*		100	
11:45	*	0	*	0	*	0	*	0	*	0	*	0	63	349	*	0	63	348
AM TOTALS		0		0		0		0		0		0		1515		295		1442
PEAK HOUR BEGINS		*		*		*		*		*		*		10:45		12:00		10:45
VOLUME		*		*		*		*		*		*		375		85		375
PHF		*		*		*		*		*		*		0.94		0.73		0.94

SASAKI ASSOCIATES, INC.
15 MINUTE, 1 CHANNEL VEHICLE COUNT
COUNT RATIO: 1.00

SITE NO.: 6367.01 FILE: 6367KNES
KINGSTON NORTH OF ESSEX SOUTHBOUND
WEEK OF MONDAY SEPTEMBER 8, 1986

HOUR BEGINS	MONDAY 8		TUESDAY 9		WEDNESDAY 10		THURSDAY 11		FRIDAY 12		WEEKDAY AVERAGE		SATURDAY 13		SUNDAY 14		7 DAY AVERAGE	
12:00	•		•		•		•		•		•		108		•		108	
12:15	•		•		•		•		•		•		107		•		107	
12:30	•		•		•		•		74		74		100		•		87	
12:45	•	0	•	0	•	0	•	0	107	181	107	181	84	399	•	0	96	398
1:00	•		•		•		•		99		99		103		•		101	
1:15	•		•		•		•		143		143		92		•		118	
1:30	•		•		•		•		98		98		113		•		106	
1:45	•	0	•	0	•	0	•	0	98	438	98	438	104	412	•	0	101	425
2:00	•		•		•		•		127		127		68		•		98	
2:15	•		•		•		•		134		134		99		•		117	
2:30	•		•		•		•		115		115		109		•		112	
2:45	•	0	•	0	•	0	•	0	127	503	127	503	116	392	•	0	122	448
3:00	•		•		•		•		125		125		102		•		114	
3:15	•		•		•		•		126		126		95		•		111	
3:30	•		•		•		•		158		158		102		•		130	
3:45	•	0	•	0	•	0	•	0	166	575	166	575	82	381	•	0	124	478
4:00	•		•		•		•		116		116		55		•		86	
4:15	•		•		•		•		119		119		97		•		108	
4:30	•		•		•		•		115		115		96		•		106	
4:45	•	0	•	0	•	0	•	0	162	512	162	512	75	323	•	0	119	418
5:00	•		•		•		•		185		185		80		•		133	
5:15	•		•		•		•		152		152		92		•		122	
5:30	•		•		•		•		184		184		84		•		134	
5:45	•	0	•	0	•	0	•	0	199	720	199	720	81	337	•	0	140	529
6:00	•		•		•		•		171		171		61		•		116	
6:15	•		•		•		•		148		148		78		•		113	
6:30	•		•		•		•		146		146		56		•		101	
6:45	•	0	•	0	•	0	•	0	116	581	116	581	56	251	•	0	86	416
7:00	•		•		•		•		105		105		53		•		79	
7:15	•		•		•		•		96		96		77		•		87	
7:30	•		•		•		•		65		65		63		•		64	
7:45	•	0	•	0	•	0	•	0	48	314	48	314	64	257	•	0	56	286
8:00	•		•		•		•		56		56		16		•		36	
8:15	•		•		•		•		64		64		29		•		47	
8:30	•		•		•		•		35		35		29		•		32	
8:45	•	0	•	0	•	0	•	0	48	203	48	203	37	111	•	0	43	157
9:00	•		•		•		•		37		37		34		•		36	
9:15	•		•		•		•		31		31		32		•		32	
9:30	•		•		•		•		44		44		28		•		36	
9:45	•	0	•	0	•	0	•	0	36	149	36	148	18	112	•	0	27	130
10:00	•		•		•		•		37		37		16		•		27	
10:15	•		•		•		•		49		49		24		•		37	
10:30	•		•		•		•		42		42		31		•		37	
10:45	•	0	•	0	•	0	•	0	31	159	31	159	29	100	•	0	30	130
11:00	•		•		•		•		45		45		31		•		38	
11:15	•		•		•		•		37		37		28		•		33	
11:30	•		•		•		•		38		38		16		•		27	
11:45	•	0	•	0	•	0	•	0	30	150	30	150	18	93	•	0	24	122
PM TOTALS		0		0		0		0		4484		4484		3168		0		3934
PEAK HOUR BEGINS		•		•		•		•		5:00		5:00		2:15		•		5:00
VOLUME		•		•		•		•		720		720		426		•		529
PHF		•		•		•		•		0.90		0.90		0.92		•		0.94

SASAKI ASSOCIATES, INC.
15 MINUTE, 1 CHANNEL VEHICLE COUNT
COUNT RATIO: 1.00

SITE NO.: 6367.01
FILE: 6367EEXS
ESSEX EAST OF KINGSTON EASTBOUND
WEEK OF MONDAY SEPTEMBER 8, 1986

HOUR BEGINS	MONDAY 8		TUESDAY 9		WEDNESDAY 10		THURSDAY 11		FRIDAY 12		WEEKDAY AVERAGE		SATURDAY 13		SUNDAY 14		7 DAY AVERAGE	
12:00	•		•		•		•		•		•		97		113		105	
12:15	•		•		•		•		•		•		109		88		99	
12:30	•		•		•		•		•		•		100		84		92	
12:45	•	0	•	0	•	0	•	0	•	0	•	0	83	389	89	374	86	382
1:00	•		•		•		•		•		•		79		53		66	
1:15	•		•		•		•		•		•		62		83		73	
1:30	•		•		•		•		•		•		67		75		71	
1:45	•	0	•	0	•	0	•	0	•	0	•	0	69	277	47	258	58	268
2:00	•		•		•		•		•		•		70		79		75	
2:15	•		•		•		•		•		•		83		94		89	
2:30	•		•		•		•		•		•		114		97		106	
2:45	•	0	•	0	•	0	•	0	•	0	•	0	81	348	79	349	80	349
3:00	•		•		•		•		•		•		42		72		57	
3:15	•		•		•		•		•		•		52		35		44	
3:30	•		•		•		•		•		•		36		54		45	
3:45	•	0	•	0	•	0	•	0	•	0	•	0	35	165	32	193	34	179
4:00	•		•		•		•		•		•		24		44		34	
4:15	•		•		•		•		•		•		20		25		23	
4:30	•		•		•		•		•		•		26		27		27	
4:45	•	0	•	0	•	0	•	0	•	0	•	0	28	98	19	115	24	107
5:00	•		•		•		•		•		•		25		21		23	
5:15	•		•		•		•		•		•		21		20		21	
5:30	•		•		•		•		•		•		15		12		14	
5:45	•	0	•	0	•	0	•	0	•	0	•	0	16	77	18	71	17	74
6:00	•		•		•		•		•		•		30		12		21	
6:15	•		•		•		•		•		•		30		20		25	
6:30	•		•		•		•		•		•		40		47		44	
6:45	•	0	•	0	•	0	•	0	•	0	•	0	29	129	24	103	27	116
7:00	•		•		•		•		•		•		37		•		37	
7:15	•		•		•		•		•		•		37		•		37	
7:30	•		•		•		•		•		•		64		•		64	
7:45	•	0	•	0	•	0	•	0	•	0	•	0	73	211	•	0	73	211
8:00	•		•		•		•		•		•		105		•		105	
8:15	•		•		•		•		•		•		109		•		109	
8:30	•		•		•		•		•		•		97		•		97	
8:45	•	0	•	0	•	0	•	0	•	0	•	0	83	394	•	0	83	394
9:00	•		•		•		•		•		•		82		•		82	
9:15	•		•		•		•		•		•		97		•		97	
9:30	•		•		•		•		•		•		123		•		123	
9:45	•	0	•	0	•	0	•	0	•	0	•	0	118	420	•	0	118	420
10:00	•		•		•		•		•		•		109		•		109	
10:15	•		•		•		•		•		•		135		•		135	
10:30	•		•		•		•		•		•		163		•		163	
10:45	•	0	•	0	•	0	•	0	•	0	•	0	162	563	•	0	162	563
11:00	•		•		•		•		•		•		143		•		143	
11:15	•		•		•		•		•		•		146		•		146	
11:30	•		•		•		•		•		•		149		•		149	
11:45	•	0	•	0	•	0	•	0	•	0	•	0	119	557	•	0	119	557
AM TOTALS		0		0		0		0		0		0		3634		1463		3624
PEAK HOUR BEGINS		•		•		•		•		•		•		10:30		12:00		10:30
VOLUME		•		•		•		•		•		•		614		374		614
PHF		•		•		•		•		•		•		0.94		0.83		0.94

SASAKI ASSOCIATES, INC.
15 MINUTE, 1 CHANNEL VEHICLE COUNT
COUNT RATIO: 1.00

SITE NO.: 6367.01
ESSEX EAST OF KINGSTON EASTBOUND
WEEK OF MONDAY SEPTEMBER 8, 1986

FILE: 6367EEKS

HOUR BEGINS	MONDAY 8		TUESDAY 9		WEDNESDAY 10		THURSDAY 11		FRIDAY 12		WEEKDAY AVERAGE		SATURDAY 13		SUNDAY 14		7 DAY AVERAGE	
12:00	*		*		*		*		*		*		166		*		166	
12:15	*		*		*		*		*		*		169		*		169	
12:30	*		*		*		*		*		*		184		*		184	
12:45	*	0	*	0	*	0	*	0	89	89	89	89	154	673	*	0	122	641
1:00	*		*		*		*		196		196		165		*		181	
1:15	*		*		*		*		208		208		153		*		181	
1:30	*		*		*		*		184		184		150		*		167	
1:45	*	0	*	0	*	0	*	0	239	827	239	827	180	648	*	0	210	738
2:00	*		*		*		*		233		233		147		*		190	
2:15	*		*		*		*		232		232		163		*		198	
2:30	*		*		*		*		243		243		169		*		206	
2:45	*	0	*	0	*	0	*	0	228	936	228	936	203	682	*	0	216	809
3:00	*		*		*		*		212		212		195		*		204	
3:15	*		*		*		*		227		227		185		*		206	
3:30	*		*		*		*		277		277		169		*		223	
3:45	*	0	*	0	*	0	*	0	225	941	225	941	175	724	*	0	200	833
4:00	*		*		*		*		141		141		140		*		141	
4:15	*		*		*		*		108		108		185		*		147	
4:30	*		*		*		*		179		179		194		*		187	
4:45	*	0	*	0	*	0	*	0	285	713	285	713	151	670	*	0	218	692
5:00	*		*		*		*		302		302		167		*		235	
5:15	*		*		*		*		284		284		201		*		243	
5:30	*		*		*		*		288		288		184		*		236	
5:45	*	0	*	0	*	0	*	0	313	1187	313	1187	194	746	*	0	254	967
6:00	*		*		*		*		270		270		157		*		214	
6:15	*		*		*		*		265		265		179		*		222	
6:30	*		*		*		*		284		284		147		*		216	
6:45	*	0	*	0	*	0	*	0	219	1038	219	1038	160	643	*	0	190	841
7:00	*		*		*		*		214		214		163		*		189	
7:15	*		*		*		*		220		220		178		*		199	
7:30	*		*		*		*		161		161		155		*		158	
7:45	*	0	*	0	*	0	*	0	165	760	165	760	187	683	*	0	176	722
8:00	*		*		*		*		168		168		139		*		154	
8:15	*		*		*		*		136		136		144		*		140	
8:30	*		*		*		*		143		143		128		*		136	
8:45	*	0	*	0	*	0	*	0	155	602	155	602	122	533	*	0	139	568
9:00	*		*		*		*		124		124		115		*		120	
9:15	*		*		*		*		139		139		129		*		134	
9:30	*		*		*		*		119		119		124		*		122	
9:45	*	0	*	0	*	0	*	0	104	486	104	486	127	495	*	0	116	491
10:00	*		*		*		*		133		133		109		*		121	
10:15	*		*		*		*		133		133		134		*		134	
10:30	*		*		*		*		124		124		139		*		132	
10:45	*	0	*	0	*	0	*	0	125	515	125	515	111	493	*	0	118	504
11:00	*		*		*		*		127		127		121		*		124	
11:15	*		*		*		*		119		119		99		*		109	
11:30	*		*		*		*		136		136		108		*		122	
11:45	*	0	*	0	*	0	*	0	118	500	118	500	99	427	*	0	109	464
PM TOTALS		0		0		0		0		8594		8594		7417		0		8265
PEAK HOUR BEGINS		*		*		*		*		5:00		5:00		2:30		*		5:00
VOLUME		*		*		*		*		1187		1187		752		*		968
PHF		*		*		*		*		0.95		0.95		0.93		*		0.95

SASAKI ASSOCIATES, INC.
15 MINUTE, 1 CHANNEL VEHICLE COUNT
COUNT RATIO: 1.00

SITE NO.: 6367.01
ESSEX EAST OF KINGSTON EASTBOUND
WEEK OF MONDAY SEPTEMBER 15, 1986

FILE: 6367EEXU

HOUR BEGINS	MONDAY 15		TUESDAY 16		WEDNESDAY 17		THURSDAY 18		FRIDAY 19		WEEKDAY AVERAGE		SATURDAY 20		SUNDAY 21		7 DAY AVERAGE	
12:00	*		*		*		74		*		74		*		*		74	
12:15	*		*		*		54		*		54		*		*		54	
12:30	*		*		*		74		*		74		*		*		74	
12:45	*	0	*	0	*	0	52	254	*	0	52	254	*	0	*	0	52	254
1:00	*		*		*		42		*		42		*		*		42	
1:15	*		*		*		50		*		50		*		*		50	
1:30	*		*		*		35		*		35		*		*		35	
1:45	*	0	*	0	*	0	41	168	*	0	41	168	*	0	*	0	41	168
2:00	*		*		*		38		*		38		*		*		38	
2:15	*		*		*		51		*		51		*		*		51	
2:30	*		*		*		65		*		65		*		*		65	
2:45	*	0	*	0	*	0	49	203	*	0	49	203	*	0	*	0	49	203
3:00	*		*		*		26		*		26		*		*		26	
3:15	*		*		*		22		*		22		*		*		22	
3:30	*		*		*		15		*		15		*		*		15	
3:45	*	0	*	0	*	0	20	83	*	0	20	83	*	0	*	0	20	83
4:00	*		*		*		11		*		11		*		*		11	
4:15	*		*		*		20		*		20		*		*		20	
4:30	*		*		*		14		*		14		*		*		14	
4:45	*	0	*	0	*	0	17	62	*	0	17	62	*	0	*	0	17	62
5:00	*		*		*		7		*		7		*		*		7	
5:15	*		*		*		15		*		15		*		*		15	
5:30	*		*		*		19		*		19		*		*		19	
5:45	*	0	*	0	*	0	25	66	*	0	25	66	*	0	*	0	25	66
6:00	*		*		*		81		*		81		*		*		81	
6:15	*		*		*		65		*		65		*		*		65	
6:30	*		*		*		79		*		79		*		*		79	
6:45	*	0	*	0	*	0	96	321	*	0	96	321	*	0	*	0	96	321
7:00	*		*		*		80		*		80		*		*		80	
7:15	*		*		*		116		*		116		*		*		116	
7:30	*		*		*		135		*		135		*		*		135	
7:45	*	0	*	0	*	0	158	489	*	0	158	489	*	0	*	0	158	489
8:00	*		*		*		121		*		121		*		*		121	
8:15	*		*		*		150		*		150		*		*		150	
8:30	*		*		*		167		*		167		*		*		167	
8:45	*	0	*	0	*	0	138	576	*	0	138	576	*	0	*	0	138	576
9:00	*		*		*		153		*		153		*		*		153	
9:15	*		*		*		145		*		145		*		*		145	
9:30	*		*		*		127		*		127		*		*		127	
9:45	*	0	*	0	*	0	115	540	*	0	115	540	*	0	*	0	115	540
10:00	*		*		*		155		*		155		*		*		155	
10:15	*		*		*		218		*		218		*		*		218	
10:30	*		*		*		162		*		162		*		*		162	
10:45	*	0	*	0	*	0	132	667	*	0	132	667	*	0	*	0	132	667
11:00	*		*		*		122		*		122		*		*		122	
11:15	*		*		*		134		*		134		*		*		134	
11:30	*		*		*		156		*		156		*		*		156	
11:45	*	0	*	0	*	0	168	580	*	0	168	580	*	0	*	0	168	580
AM TOTALS		0		0		0		4009		0		4009		0		0		4009
PEAK HOUR BEGINS		*		*		*		10:00		*		10:00		*		*		10:00
VOLUME		*		*		*		667		*		667		*		*		667
PHF		*		*		*		0.76		*		0.76		*		*		0.76

SASAKI ASSOCIATES, INC.
15 MINUTE, 1 CHANNEL VEHICLE COUNT
COUNT RATIO: 1.00

SITE NO.: 6367.01 FILE: 6367EEXW
ESSEX EAST OF KINGSTON EASTBOUND
WEEK OF MONDAY SEPTEMBER 15, 1986

HOUR BEGINS	MONDAY 15		TUESDAY 16		WEDNESDAY 17		THURSDAY 18		FRIDAY 19		WEEKDAY AVERAGE		SATURDAY 20		SUNDAY 21		7 DAY AVERAGE	
12:00	*		*		*		157		*		157		*		*		157	
12:15	*		*		*		162		*		162		*		*		162	
12:30	*		*		*		143		*		143		*		*		143	
12:45	*	0	*	0	*	0	128	590	*	0	128	590	*	0	*	0	128	590
1:00	*		*		*		143		*		143		*		*		143	
1:15	*		*		*		169		*		169		*		*		169	
1:30	*		*		*		188		*		188		*		*		188	
1:45	*	0	*	0	175	175	*	500	*	0	175	675	*	0	*	0	175	675
2:00	*		*		205		*		*		205		*		*		205	
2:15	*		*		199		*		*		199		*		*		199	
2:30	*		*		141		*		*		141		*		*		141	
2:45	*	0	*	0	192	737	*	0	*	0	192	737	*	0	*	0	192	737
3:00	*		*		199		*		*		199		*		*		199	
3:15	*		*		207		*		*		207		*		*		207	
3:30	*		*		231		*		*		231		*		*		231	
3:45	*	0	*	0	262	899	*	0	*	0	262	899	*	0	*	0	262	899
4:00	*		*		219		*		*		219		*		*		219	
4:15	*		*		245		*		*		245		*		*		245	
4:30	*		*		251		*		*		251		*		*		251	
4:45	*	0	*	0	283	998	*	0	*	0	283	998	*	0	*	0	283	998
5:00	*		*		290		*		*		290		*		*		290	
5:15	*		*		289		*		*		289		*		*		289	
5:30	*		*		279		*		*		279		*		*		279	
5:45	*	0	*	0	272	1130	*	0	*	0	272	1130	*	0	*	0	272	1130
6:00	*		*		236		*		*		236		*		*		236	
6:15	*		*		240		*		*		240		*		*		240	
6:30	*		*		228		*		*		228		*		*		228	
6:45	*	0	*	0	258	962	*	0	*	0	258	962	*	0	*	0	258	962
7:00	*		*		257		*		*		257		*		*		257	
7:15	*		*		225		*		*		225		*		*		225	
7:30	*		*		162		*		*		162		*		*		162	
7:45	*	0	*	0	214	858	*	0	*	0	214	858	*	0	*	0	214	858
8:00	*		*		152		*		*		152		*		*		152	
8:15	*		*		136		*		*		136		*		*		136	
8:30	*		*		129		*		*		129		*		*		129	
8:45	*	0	*	0	123	540	*	0	*	0	123	540	*	0	*	0	123	540
9:00	*		*		163		*		*		163		*		*		163	
9:15	*		*		131		*		*		131		*		*		131	
9:30	*		*		116		*		*		116		*		*		116	
9:45	*	0	*	0	118	528	*	0	*	0	118	528	*	0	*	0	118	528
10:00	*		*		106		*		*		106		*		*		106	
10:15	*		*		126		*		*		126		*		*		126	
10:30	*		*		119		*		*		119		*		*		119	
10:45	*	0	*	0	125	476	*	0	*	0	125	476	*	0	*	0	125	476
11:00	*		*		99		*		*		99		*		*		99	
11:15	*		*		88		*		*		88		*		*		88	
11:30	*		*		99		*		*		99		*		*		99	
11:45	*	0	*	0	84	370	*	0	*	0	84	370	*	0	*	0	84	370
PM TOTALS		0		0		7673		1090		0		8763		0		0		8763
PEAK HOUR BEGINS		*		*		4:45		12:45		*		4:45		*		*		4:45
VOLUME		*		*		1141		628		*		1141		*		*		1141
PHF		*		*		0.98		0.94		*		0.98		*		*		0.98

APPENDIX B-2

INTERSECTION TURNING MOVEMENT COUNT SUMMARIES

(AM, PM, and SAT peak hours)

- Summer/High/South
- Summer/Lincoln/Bedford
- Summer/Otis/Kingston
- Bedford/Columbia
- Bedford/Kingston
- Bedford/Chauncy/LP Garage
- Surface Artery/Essex/Lincoln
- Essex/Columbia/Lincoln
- Essex/Kingston/Ave. DeLafayette
- Essex/Harrison/Chauncy
- Essex/Washington
- Harrison/Beach
- Surface Artery/South
- 600 Washington Street Counts

TRAFFIC MOVEMENT SUMMARY TABLE

Project: KINGSTON-BEDFORD EIR — Project number: 6367.00

Muncipality: BOSTON — Date: 9/11/86 — Day: THURSDAY — Weather: CLEAR — By: TW
Intersection: SUMMER/HIGH/SOUTH
Vehicle Type: ALL

Period	EB on SUMMER				WB on SUMMER				NB on SOUTH				SB on HIGH				TOTALS			
	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL
7:00 - 7:15	13	12	8	33		29	23	52	21	67		88	2	14	16	32	36	122	47	205
7:15 - 7:30	5	15	26	46		47	20	67	30	68		98	1	11	19	31	36	141	65	242
7:30 - 7:45	11	9	20	40		54	19	73	32	77		109	6	12	18	36	49	152	57	258
7:45 - 8:00	13	14	23	50		48	19	67	33	97		130	1	8	19	28	47	167	61	275
8:00 - 8:15	26	7	17	50		32	38	70	9	126		135	4	11	9	24	39	176	64	279
8:15 - 8:30	22	7	26	55		38	28	66	8	138		146	2	18	16	36	32	201	70	303
8:30 - 8:45	15	7	20	42		42	24	66	18	84		102	1	9	21	31	34	142	65	241
8:45 - 9:00	13	14	19	46		56	27	83	23	89		112	5	17	19	41	41	176	65	282
9:00 - 9:15																				
9:15 - 9:30																				
9:30 - 9:45																				
9:45 - 10:00																				
10:00 - 10:15																				
10:15 - 10:30																				
10:30 - 10:45																				
10:45 - 11:00																				
11:00 - 11:15																				
11:15 - 11:30																				
11:30 - 11:45																				
11:45 - 12:00																				
A.M. TOTALS	118	85	159	362	0	346	198	544	174	746	0	920	22	100	137	259	314	1,277	494	2,085
12:00 - 12:15																				
12:15 - 12:30																				
12:30 - 12:45																				
12:45 - 13:00																				
13:00 - 13:15																				
13:15 - 13:30																				
13:30 - 13:45																				
13:45 - 14:00																				
14:00 - 14:15																				
14:15 - 14:30																				
14:30 - 14:45																				
14:45 - 15:00																				
15:00 - 15:15																				
15:15 - 15:30																				
15:30 - 15:45	16	16	29	61		32	23	55	12	35		47	4	18	18	40	32	101	70	203
15:45 - 16:00	19	12	18	49		40	30	70	12	41		53	2	19	20	41	33	112	68	213
16:00 - 16:15	31	18	26	75		39	19	58	7	54		61	4	12	10	26	42	123	55	220
16:15 - 16:30	20	18	25	63		27	22	49	8	48		56	4	17	14	35	32	110	61	203
16:30 - 16:45	12	14	27	53		31	27	58	10	61		71	3	14	7	24	25	120	61	206
16:45 - 17:00	23	9	27	59		40	26	66	6	42		48	0	29	22	51	29	120	75	224
17:00 - 17:15	23	13	35	71		40	23	63	10	53		63	6	16	3	25	39	122	61	222
17:15 - 17:30	18	11	32	61		47	12	59	9	54		63	3	32	28	63	30	144	72	246
17:30 - 17:45	23	13	27	63		43	15	58	8	39		47	6	30	19	55	37	125	61	223
17:45 - 18:00	15	11	24	50		43	24	67	2	28		30	4	22	19	45	21	104	67	192
P.M. TOTALS	200	135	270	605	0	382	221	603	84	455	0	539	36	209	160	405	320	1,181	651	2,152
DAILY TOTALS	318	220	429	967	0	728	419	1,147	258	1201	0	1,459	58	309	297	664	634	2,458	1,145	4,237

Peak AM 60-min totals (7:30 - 8:30):

72	37	86	195	0	172	104	276	82	438	0	520	13	49	62	124	167	696	252	1,115

Peak PM 60-min totals (16:45 - 17:45):

87	46	121	254	0	170	76	246	33	188	0	221	15	107	72	194	135	511	269	915

TRAFFIC MOVEMENT SUMMARY TABLE

Project: KINGSTON-BEDFORD EIR Project number: 6367.00

Muncipality: BOSTON Date: 9/13/86 Day: SATURDAY Weather: CLEAR By: MED
Intersection: SUMMER/HIGH/SOUTH
Vehicle Type: ALL

	EB on SUMMER				WB on SUMMER				NB on SOUTH				SB on HIGH				TOTALS			
Period	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL
7:00 - 7:15																				
7:15 - 7:30																				
7:30 - 7:45																				
7:45 - 8:00																				
8:00 - 8:15																				
8:15 - 8:30																				
8:30 - 8:45																				
8:45 - 9:00																				
9:00 - 9:15																				
9:15 - 9:30																				
9:30 - 9:45																				
9:45 - 10:00																				
10:00 - 10:15																				
10:15 - 10:30																				
10:30 - 10:45																				
10:45 - 11:00																				
11:00 - 11:15																				
11:15 - 11:30																				
11:30 - 11:45																				
11:45 - 12:00																				
A.M. TOTALS	0	0	0		0	0	0		0	0	0		0	0	0		0	0	0	0
12:00 - 12:15																				
12:15 - 12:30																				
12:30 - 12:45																				
12:45 - 13:00																				
13:00 - 13:15	7	8	12	27		27	8	35	5	21		26	2	29	43	74	14	85	63	162
13:15 - 13:30	4	12	13	29		40	14	54	1	13		14	1	14	29	44	6	79	56	141
13:30 - 13:45	10	11	11	32		37	13	50	7	8		15	2	13	27	42	19	69	51	139
13:45 - 14:00	4	8	11	23		36	13	49	5	10		15	2	9	37	48	11	63	61	135
14:00 - 14:15	7	10	16	33		52	7	59	6	12		18	2	11	27	40	15	85	50	150
14:15 - 14:30	2	13	18	33		49	14	63	7	11		18	2	10	34	46	11	83	66	160
14:30 - 14:45	2	14	10	26		39	9	48	2	8		10	0	13	22	35	4	74	41	119
14:45 - 15:00	1	8	5	14		44	7	51	3	8		11	1	16	21	38	5	76	33	114
15:00 - 15:15	5	8	10	23		42	16	58	1	8		9	1	14	24	39	7	72	50	129
15:15 - 15:30	2	7	16	25		31	17	48	5	15		20	0	11	25	36	7	64	58	129
15:30 - 15:45	1	9	5	15		36	11	47	2	15		17	2	17	21	40	5	77	37	119
15:45 - 16:00	4	8	10	22		40	6	46	6	15		21	5	13	39	57	15	76	55	146
16:00 - 16:15																				
16:15 - 16:30																				
16:30 - 16:45																				
16:45 - 17:00																				
17:00 - 17:15																				
17:15 - 17:30																				
17:30 - 17:45																				
17:45 - 18:00																				
P.M. TOTALS	49	116	137	302	0	473	135	608	50	144	0	194	20	170	349	539	119	903	621	1,643
DAILY TOTALS	49	116	137		0	473	135		50	144	0		20	170	349		119	903	621	0
Peak AM 60-min totals (7:00 - 8:00):	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak PM 60-min totals (13:30 - 14:30):	23	42	56	121	0	174	47	221	25	41	0	66	8	43	125	176	56	300	228	584

TRAFFIC MOVEMENT SUMMARY TABLE

Project: KINGSTON-BEDFORD EIR Project number: 6367.00

Muncipality: BOSTON Date: 9/9/86 Day: TUESDAY Weather: CLEAR By: DS
Intersection: SUMMER/LINCOLN/BEDFORD
Vehicle Type: ALL

	EB on SUMMER				WB on SUMMER				NB on LINCOLN				SB on NA				TOTALS			
Period	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL
7:00 - 7:15		17	0	17	25	57		82	30	70	10	110					55	144	10	209
7:15 - 7:30		31	1	32	26	61		87	28	83	23	134					54	175	24	253
7:30 - 7:45		25	0	25	22	65		87	47	87	18	152					69	177	18	264
7:45 - 8:00		35	0	35	20	73		93	60	98	25	183					80	206	25	311
8:00 - 8:15		27	2	29	31	48		79	88	71	33	192					119	146	35	300
8:15 - 8:30		23	1	24	40	28		68	73	71	25	169					113	122	26	261
8:30 - 8:45		21	7	28	33	35		68	62	82	19	163					95	138	26	259
8:45 - 9:00		28	1	29	36	25		61	79	70	10	159					115	123	11	249
9:00 - 9:15																				
9:15 - 9:30																				
9:30 - 9:45																				
9:45 - 10:00																				
10:00 - 10:15																				
10:15 - 10:30																				
10:30 - 10:45																				
10:45 - 11:00																				
11:00 - 11:15																				
11:15 - 11:30																				
11:30 - 11:45																				
11:45 - 12:00																				
A.M. TOTALS	0	207	12	219	233	392	0	625	467	632	163	1,262	0	0	0		700	1,231	175	2,106
12:00 - 12:15																				
12:15 - 12:30																				
12:30 - 12:45																				
12:45 - 13:00																				
13:00 - 13:15																				
13:15 - 13:30																				
13:30 - 13:45																				
13:45 - 14:00																				
14:00 - 14:15																				
14:15 - 14:30																				
14:30 - 14:45																				
14:45 - 15:00																				
15:00 - 15:15																				
15:15 - 15:30																				
15:30 - 15:45		37	0	37	35	30		65	18	39	24	81					53	106	24	183
15:45 - 16:00		27	3	30	13	20		33	20	36	28	84					33	83	31	147
16:00 - 16:15		17	1	18	24	46		70	20	59	23	102					44	122	24	190
16:15 - 16:30		24	0	24	18	29		47	14	62	31	107					32	115	31	178
16:30 - 16:45		24	2	26	22	37		59	12	48	38	98					34	109	40	183
16:45 - 17:00		45	1	46	16	46		62	15	49	36	100					31	140	37	208
17:00 - 17:15		31	1	32	24	37		61	13	65	27	105					37	133	28	198
17:15 - 17:30		35	0	35	18	30		48	13	32	36	81					31	97	36	164
17:30 - 17:45		40	0	40	15	41		56	19	48	29	96					34	129	29	192
17:45 - 18:00		30	5	35	22	33		55	12	62	22	96					34	125	27	186
P.M. TOTALS	0	310	13	323	207	349	0	556	156	500	294	950	0	0	0		363	1,159	307	1,829
DAILY TOTALS	0	517	25	542	440	741	0	1,181	623	1132	457	2,212	0	0	0		1,063	2,390	482	3,935

Peak AM 60-min totals (7:30 - 8:30):

0	110	3	113	113	214	0	327	268	327	101	696	0	0	0	0	381	651	104	1,136

Peak PM 60-min totals (16:15 - 17:15):

0	124	4	128	80	149	0	229	54	224	132	410	0	0	0	0	134	497	136	767

TRAFFIC MOVEMENT SUMMARY TABLE

Project: KINGSTON-BEDFORD EIR Project number: 6367.00

Muncipality: BOSTON Date: 9/6/86 Day: SATURDAY Weather: CLEAR By: DS
Intersection: SUMMER/LINCOLN/BEDFORD
Vehicle Type: ALL

	EB on SUMMER				WB on SUMMER				NB on LINCOLN				SB on NA				TOTALS			
Period	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL
7:00 - 7:15																				
7:15 - 7:30																				
7:30 - 7:45																				
7:45 - 8:00																				
8:00 - 8:15																				
8:15 - 8:30																				
8:30 - 8:45																				
8:45 - 9:00																				
9:00 - 9:15																				
9:15 - 9:30																				
9:30 - 9:45																				
9:45 - 10:00																				
10:00 - 10:15																				
10:15 - 10:30																				
10:30 - 10:45																				
10:45 - 11:00																				
11:00 - 11:15																				
11:15 - 11:30																				
11:30 - 11:45																				
11:45 - 12:00																				
A.M. TOTALS	0	0	0		0	0	0		0	0	0		0	0	0		0	0	0	0
12:00 - 12:15																				
12:15 - 12:30																				
12:30 - 12:45																				
12:45 - 13:00																				
13:00 - 13:15		20	0	20	22	46		68	30	41	16	87					52	107	16	175
13:15 - 13:30		18	1	19	21	53		74	36	39	10	85					57	110	11	179
13:30 - 13:45		13	2	15	17	54		71	25	33	6	64					42	100	8	150
13:45 - 14:00		18	1	19	22	46		68	27	49	10	86					49	113	11	173
14:00 - 14:15		17	1	18	17	62		79	32	42	5	79					49	121	6	176
14:15 - 14:30		17	0	17	27	42		69	22	48	7	77					49	107	7	163
14:30 - 14:45		13	0	13	19	45		64	22	29	9	60					41	87	9	137
14:45 - 15:00		15	1	16	17	55		72	30	32	9	71					47	102	10	159
15:00 - 15:15		34	0	34	17	65		82	35	50	2	87					52	149	2	203
15:15 - 15:30		17	1	18	21	31		52	30	43	8	91					51	91	9	151
15:30 - 15:45		21	0	21	15	32		47	19	36	5	60					34	89	5	128
15:45 - 16:00		21	0	21	17	45		62	13	43	2	58					30	109	2	141
16:00 - 16:15																				
16:15 - 16:30																				
16:30 - 16:45																				
16:45 - 17:00																				
17:00 - 17:15																				
17:15 - 17:30																				
17:30 - 17:45																				
17:45 - 18:00																				
P.M. TOTALS	0	224	7	231	232	576	0	808	321	485	89	895	0	0	0		553	1,285	96	1,934
DAILY TOTALS	0	224	7		232	576	0		321	485	89		0	0	0		553	1,285	96	0

Peak AM 60-min totals (7:00 - 8:00):

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Peak PM 60-min totals (13:15 - 14:15):

0	66	5	71	77	215	0	292	120	163	31	314	0	0	0	0	197	444	36	677

[illegible] COUNT SUMMARY TABLE

Project: KINGSTON-BEDFORD CIR

Project number: 6367.00

Municipality: BOSTON
Intersection: OTIS/SUMMER
Vehicle Type: ALL

Date: 9/4/86

Day: THURSDAY

Weather: CLOUDY

By: OS

Period	EB on NA				WB on SUMMER				NB on NA				SB on OTIS				TOTALS			
	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL
7:00 - 7:15					6			6					20	11		31	26	11		37
7:15 - 7:30					13			13					25	21		47	39	21		60
7:30 - 7:45					11			11					21	19		40	32	19		51
7:45 - 8:00					23			23					17	22		39	40	22		62
8:00 - 8:15					10			10					24	30		54	34	30		64
8:15 - 8:30					10			10					26	33		59	36	33		69
8:30 - 8:45					25			25					29	34		63	54	34		88
8:45 - 9:00					19			19					29	40		69	48	40		88
9:00 - 9:15																				
9:15 - 9:30																				
9:30 - 9:45																				
9:45 - 10:00																				
10:00 - 10:15																				
10:15 - 10:30																				
10:30 - 10:45																				
10:45 - 11:00																				
11:00 - 11:15																				
11:15 - 11:30																				
11:30 - 11:45																				
11:45 - 12:00																				
A.M. TOTALS	0	0	0		117	0	0	117	0	0	0		192	210	0	402	309	210	0	519
12:00 - 12:15																				
12:15 - 12:30																				
12:30 - 12:45																				
12:45 - 13:00																				
13:00 - 13:15																				
13:15 - 13:30																				
13:30 - 13:45																				
13:45 - 14:00																				
14:00 - 14:15																				
14:15 - 14:30																				
14:30 - 14:45																				
14:45 - 15:00																				
15:00 - 15:15																				
15:15 - 15:30																				
15:30 - 15:45					16			16					35	61		96	51	61		112
15:45 - 16:00					33			33					24	31		55	57	31		88
16:00 - 16:15					28			28					36	46		82	64	46		110
16:15 - 16:30					23			23					38	60		98	61	60		121
16:30 - 16:45					27			27					39	73		112	66	73		139
16:45 - 17:00					25			25					31	57		88	56	57		113
17:00 - 17:15					21			21					37	68		105	58	68		126
17:15 - 17:30					17			17					37	77		114	54	77		131
17:30 - 17:45					25			25					37	66		103	62	66		128
17:45 - 18:00					22			22					34	73		107	56	73		129
P.M. TOTALS	0	0	0		237	0	0	237	0	0	0		348	612	0	960	585	612	0	1,197
DAILY TOTALS	0	0	0		354	0	0	354	0	0	0		540	822	0	1,362	894	822	0	1,716

Peak AM 60-min totals (8:00 - 9:00):

0	0	0	0	64	0	0	64	0	0	0	0	108	137	0	245	172	137	0	309

Peak PM 60-min totals (17:00 - 18:00):

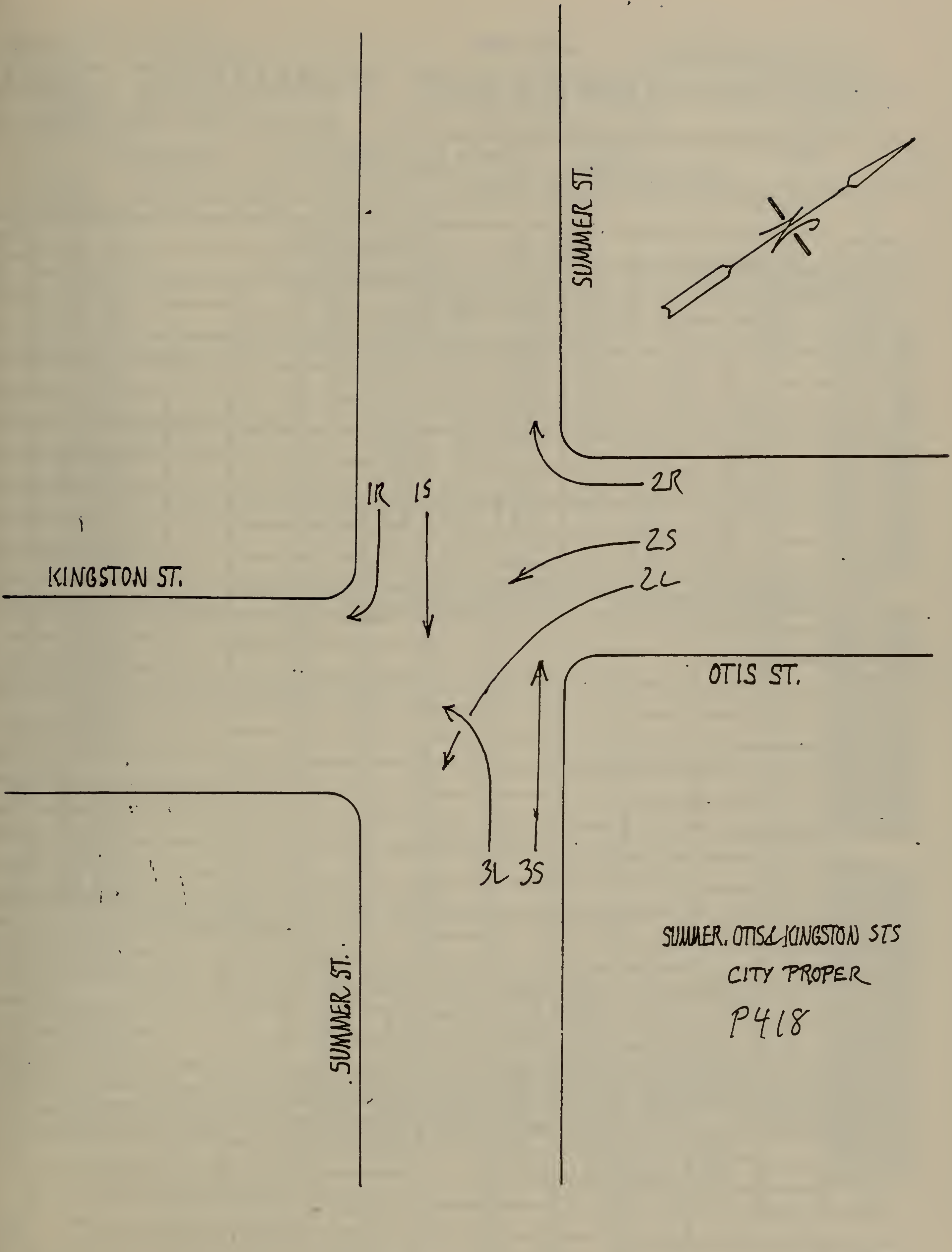
0	0	0	0	85	0	0	85	0	0	0	0	145	284	0	429	230	284	0	514

TRAFFIC MOVEMENT SUMMARY TABLE

Project: KINGSTON-BEDFORD EIR
Project number: 6367.00

Muncipality: BOSTON
Date: 9/13/86
Day: SATURDAY
Weather: CLEAR
By: TW
Intersection: OTIS/SUMMER
Vehicle Type: ALL

	EB on NA				WB on SUMMER				NB on NA				SB on OTIS				TOTALS			
Period	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL
7:00 - 7:15																				
7:15 - 7:30																				
7:30 - 7:45																				
7:45 - 8:00																				
8:00 - 8:15																				
8:15 - 8:30																				
8:30 - 8:45																				
8:45 - 9:00																				
9:00 - 9:15																				
9:15 - 9:30																				
9:30 - 9:45																				
9:45 - 10:00																				
10:00 - 10:15																				
10:15 - 10:30																				
10:30 - 10:45																				
10:45 - 11:00																				
11:00 - 11:15																				
11:15 - 11:30																				
11:30 - 11:45																				
11:45 - 12:00																				
A.M. TOTALS	0	0	0		0	0	0		0	0	0		0	0	0		0	0	0	0
12:00 - 12:15																				
12:15 - 12:30																				
12:30 - 12:45																				
12:45 - 13:00																				
13:00 - 13:15					30			30					14	24		38	44	24		68
13:15 - 13:30					38			38					19	25		44	57	25		82
13:30 - 13:45					22			22					18	29		47	40	29		69
13:45 - 14:00					35			35					18	24		42	53	24		77
14:00 - 14:15					28			28					17	26		43	45	26		71
14:15 - 14:30					39			39					18	41		59	57	41		98
14:30 - 14:45					36			36					21	29		50	57	29		86
14:45 - 15:00					38			38					19	40		59	57	40		97
15:00 - 15:15					27			27					20	33		53	47	33		80
15:15 - 15:30					18			18					17	26		43	35	26		61
15:30 - 15:45					30			30					15	29		44	45	29		74
15:45 - 16:00					23			23					24	28		52	47	28		75
16:00 - 16:15																				
16:15 - 16:30																				
16:30 - 16:45																				
16:45 - 17:00																				
17:00 - 17:15																				
17:15 - 17:30																				
17:30 - 17:45																				
17:45 - 18:00																				
P.M. TOTALS	0	0	0		364	0	0	364	0	0	0		220	354	0	574	584	354	0	938
DAILY TOTALS	0	0	0		364	0	0		0	0	0		220	354	0		584	354	0	0
Peak AM 60-min totals (7:00 - 8:00):																				
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak PM 60-min totals (14:15 - 15:15):																				
	0	0	0	0	140	0	0	140	0	0	0	0	78	143	0	221	218	143	0	361



SUMMER, OTIS & KINGSTON STS
CITY PROPER
P418

Leo Sullivan 427-1652 STA. NO. --

TRAFFIC MOVEMENT SUMMARY TABLE

LOCATION Summer, Otis & Kingston Sts _ CITY OR TOWN City Proper _ _

DATE _ _ _ _ _ _ _ DAY OF WEEK _ _ _ _ WEATHER _ _ _ _ RECORDER _ _ _

P418

TIME STARTS __M	Summer St			Otis St			Summer St						TOTA HALF HO TALL
	Toward S. Sta.						Toward Wash						
		1S	1R	2L	2S	2R	3L	3S					
700-715		6	3	4	20	0	14	0					
715-730		7	15	8	29	0	14	1					
730-745		11	3	13	27	0	17	3					
745-800		8	12	20	38	0	24	1					
800-815		13	6	11	49	0	27	1					
815-830		10	12	12	47	0	34	0					
830-845		8	15	16	38	0	29	4					
845-900		8	15	13	42	0	30	0					
~~1100-1115~~													
~~1115-1130~~													
~~1130-1145~~													
~~1145-1200~~													
~~1200-1215~~													
~~1215-1230~~													
~~1230-1245~~													
~~1245-100~~													
~~300-315~~													
~~315-330~~													
~~330-345~~													
~~345-400~~													
400-415		18	9	16	64	0	19	0					
415-430		9	9	16	68	0	12	1					
430-445		13	26	25	86	0	19	0					
445-500		20	11	21	58	0	14	1					
500-515		11	20	21	76	0	14	1					
515-530		19	24	16	72	0	18	0					
530-545		22	19	24	73	0	29	3					
545-600		19	20	21	72		16	4					
TOTAL													GRAN TOT
TOTAL													

TRAFFIC MOVEMENT SUMMARY TABLE

Project: KINGSTON-BEDFORD EIR Project number: 6367.00

Muncipality: BOSTON Date: 9/17/86 Day: WEDNESDAY Weather: CLEAR By: MEO
Intersection: BEDFORD/COLUMBIA
Vehicle Type: ALL

Period	EB on MA				WB on BEDFORD				NB on COLUMBIA				SB on MA				TOTALS			
	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL
7:00 - 7:15						34		34	1			1					1	34		35
7:15 - 7:30						53		53	3			3					3	53		56
7:30 - 7:45						91		91	3			3					3	91		94
7:45 - 8:00						69		69	2			2					2	69		71
8:00 - 8:15						86		86	3			3					3	86		89
8:15 - 8:30						95		95	2			2					2	95		97
8:30 - 8:45						166		166	0									166		166
8:45 - 9:00						165		165	5			5					5	165		170
9:00 - 9:15																				
9:15 - 9:30																				
9:30 - 9:45																				
9:45 - 10:00																				
10:00 - 10:15																				
10:15 - 10:30																				
10:30 - 10:45																				
10:45 - 11:00																				
11:00 - 11:15																				
11:15 - 11:30																				
11:30 - 11:45																				
11:45 - 12:00																				
A.M. TOTALS	0	0	0		0	759	0	759	19	0	0	19	0	0	0		19	759	0	778
12:00 - 12:15																				
12:15 - 12:30																				
12:30 - 12:45																				
12:45 - 13:00																				
13:00 - 13:15																				
13:15 - 13:30																				
13:30 - 13:45																				
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14:00 - 14:15																				
14:15 - 14:30																				
14:30 - 14:45																				
14:45 - 15:00																				
15:00 - 15:15																				
15:15 - 15:30																				
15:30 - 15:45						40		40	3			3					3	40		43
15:45 - 16:00						44		44	1			1					1	44		45
16:00 - 16:15						46		46	6			6					6	46		52
16:15 - 16:30						41		41	2			2					2	41		43
16:30 - 16:45						44		44	3			3					3	44		47
16:45 - 17:00						46		46	6			6					6	46		52
17:00 - 17:15						39		39	11			11					11	39		50
17:15 - 17:30						49		49	1			1					1	49		50
17:30 - 17:45						52		52	3			3					3	52		55
17:45 - 18:00						44		44	1			1					1	44		45
P.M. TOTALS	0	0	0		0	445	0	445	37	0	0	37	0	0	0		37	445	0	482
DAILY TOTALS	0	0	0		0	1204	0	1,204	56	0	0	56	0	0	0		56	1,204	0	1,260
Peak AM 60-min totals (8:00 - 9:00):																				
	0	0	0	0	0	512	0	512	10	0	0	10	0	0	0	0	10	512	0	522
Peak PM 60-min totals (16:45 - 17:45):																				
	0	0	0	0	0	186	0	186	21	0	0	21	0	0	0	0	21	186	0	207

```
TRAFFIC MOVEMENT SUMMARY TABLE
--------------------------------------------------------------------------------------------------------------------------------
Project:      KINGSTON-BEDFORD EIR                                                                       Project number: 6367.00
--------------------------------------------------------------------------------------------------------------------------------
Municipality:  BOSTON                                     Date:  9/13/86        Day: SATURDAY        Weather: CLEAR        By: MED
Intersection:  BEDFORD/COLUMBIA
Vehicle Type:  ALL
--------------------------------------------------------------------------------------------------------------------------------
              ¦ EB on NA             ¦ WB on BEDFORD        ¦ NB on  COLUMBIA      ¦ SB on NA             ¦         TOTALS
              ¦                      ¦                      ¦                      ¦                      ¦
[illegible]   ¦    LT   TH   RT  ALL ¦    LT   TH   RT  ALL ¦    LT   TH   RT  ALL ¦    LT   TH   RT  ALL ¦    LT   TH   RT  ALL
================================================================================================================================
 7:00 -  7:15 ¦                      ¦                      ¦                      ¦                      ¦
 7:15 -  7:30 ¦                      ¦                      ¦                      ¦                      ¦
 7:30 -  7:45 ¦                      ¦                      ¦                      ¦                      ¦
 7:45 -  8:00 ¦                      ¦                      ¦                      ¦                      ¦
--------------------------------------------------------------------------------------------------------------------------------
 8:00 -  8:15 ¦                      ¦                      ¦                      ¦                      ¦
 8:15 -  8:30 ¦                      ¦                      ¦                      ¦                      ¦
 8:30 -  8:45 ¦                      ¦                      ¦                      ¦                      ¦
 8:45 -  9:00 ¦                      ¦                      ¦                      ¦                      ¦
--------------------------------------------------------------------------------------------------------------------------------
 9:00 -  9:15 ¦                      ¦                      ¦                      ¦                      ¦
 9:15 -  9:30 ¦                      ¦                      ¦                      ¦                      ¦
 9:30 -  9:45 ¦                      ¦                      ¦                      ¦                      ¦
 9:45 - 10:00 ¦                      ¦                      ¦                      ¦                      ¦
--------------------------------------------------------------------------------------------------------------------------------
10:00 - 10:15 ¦                      ¦                      ¦                      ¦                      ¦
10:15 - 10:30 ¦                      ¦                      ¦                      ¦                      ¦
10:30 - 10:45 ¦                      ¦                      ¦                      ¦                      ¦
10:45 - 11:00 ¦                      ¦                      ¦                      ¦                      ¦
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11:00 - 11:15 ¦                      ¦                      ¦                      ¦                      ¦
11:15 - 11:30 ¦                      ¦                      ¦                      ¦                      ¦
11:30 - 11:45 ¦                      ¦                      ¦                      ¦                      ¦
11:45 - 12:00 ¦                      ¦                      ¦                      ¦                      ¦
--------------------------------------------------------------------------------------------------------------------------------
  A.M. TOTALS ¦     0    0    0      ¦     0    0    0      ¦     0    0    0      ¦     0    0    0      ¦     0    0    0    0
================================================================================================================================
12:00 - 12:15 ¦                      ¦                      ¦                      ¦                      ¦
12:15 - 12:30 ¦                      ¦                      ¦                      ¦                      ¦
12:30 - 12:45 ¦                      ¦                      ¦                      ¦                      ¦
12:45 - 13:00 ¦                      ¦                      ¦                      ¦                      ¦
--------------------------------------------------------------------------------------------------------------------------------
13:00 - 13:15 ¦                      ¦         63        63 ¦     4              4 ¦                      ¦     4   63        67
13:15 - 13:30 ¦                      ¦         47        47 ¦     7              7 ¦                      ¦     7   47        54
13:30 - 13:45 ¦                      ¦         53        53 ¦     4              4 ¦                      ¦     4   53        57
13:45 - 14:00 ¦                      ¦         61        61 ¦     4              4 ¦                      ¦     4   61        65
--------------------------------------------------------------------------------------------------------------------------------
14:00 - 14:15 ¦                      ¦         63        63 ¦     5              5 ¦                      ¦     5   63        68
14:15 - 14:30 ¦                      ¦         50        50 ¦     1              1 ¦                      ¦     1   50        51
14:30 - 14:45 ¦                      ¦         52        52 ¦     2              2 ¦                      ¦     2   52        54
14:45 - 15:00 ¦                      ¦         47        47 ¦     2              2 ¦                      ¦     2   47        49
--------------------------------------------------------------------------------------------------------------------------------
15:00 - 15:15 ¦                      ¦         55        55 ¦     5              5 ¦                      ¦     5   55        60
15:15 - 15:30 ¦                      ¦         44        44 ¦     4              4 ¦                      ¦     4   44        48
15:30 - 15:45 ¦                      ¦         29        29 ¦     2              2 ¦                      ¦     2   29        31
15:45 - 16:00 ¦                      ¦         45        45 ¦     2              2 ¦                      ¦     2   45        47
--------------------------------------------------------------------------------------------------------------------------------
16:00 - 16:15 ¦                      ¦                      ¦                      ¦                      ¦
16:15 - 16:30 ¦                      ¦                      ¦                      ¦                      ¦
16:30 - 16:45 ¦                      ¦                      ¦                      ¦                      ¦
16:45 - 17:00 ¦                      ¦                      ¦                      ¦                      ¦
--------------------------------------------------------------------------------------------------------------------------------
17:00 - 17:15 ¦                      ¦                      ¦                      ¦                      ¦
17:15 - 17:30 ¦                      ¦                      ¦                      ¦                      ¦
17:30 - 17:45 ¦                      ¦                      ¦                      ¦                      ¦
17:45 - 18:00 ¦                      ¦                      ¦                      ¦                      ¦
--------------------------------------------------------------------------------------------------------------------------------
  P.M. TOTALS ¦     0    0    0      ¦     0  609    0  609 ¦    42    0    0   42 ¦     0    0    0      ¦    42  609    0  651
================================================================================================================================
 DAILY TOTALS ¦     0    0    0      ¦     0  609    0      ¦    42    0    0      ¦     0    0    0      ¦    42  609    0    0
================================================================================================================================


   Peak AM 60-min totals ( 7:00 -  8:00):
--------------------------------------------------------------------------------------------------------------------------------
                    0    0    0    0      0    0    0    0      0    0    0    0      0    0    0    0      0    0    0    0

   Peak PM 60-min totals (13:15 - 14:15):
--------------------------------------------------------------------------------------------------------------------------------
                    0    0    0    0      0  224    0  224     20    0    0   20      0    0    0    0     20  224    0  244
```

TRAFFIC MOVEMENT SUMMARY TABLE

Project: KINGSTON-BEDFORD EIR — Project number: 6367.00

Muncipality: BOSTON — Date: 9/17/86 — Day: WEDNESDAY — Weather: CLEAR — By: MED
Intersection: BEDFORD/KINGSTON
Vehicle Type: ALL

	EB on BEDFORD				WB on BEDFORD				NB on NA				SB on KINGSTON				TOTALS			
Period	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL
7:00 - 7:15			8	8	10	33		43						22	6	28	10	55	14	79
7:15 - 7:30			8	8	10	34		44						12	5	17	10	46	13	69
7:30 - 7:45			12	12	15	42		57						14	4	18	15	56	16	87
7:45 - 8:00			8	8	16	39		55						37	15	52	16	76	23	115
8:00 - 8:15			16	16	10	39		49						29	12	41	10	68	28	106
8:15 - 8:30			9	9	13	57		70						25	17	42	13	82	26	121
8:30 - 8:45			10	10	17	69		86						30	21	51	17	99	31	147
8:45 - 9:00			8	8	17	84		101						15	17	32	17	99	25	141
9:00 - 9:15																				
9:15 - 9:30																				
9:30 - 9:45																				
9:45 - 10:00																				
10:00 - 10:15																				
10:15 - 10:30																				
10:30 - 10:45																				
10:45 - 11:00																				
11:00 - 11:15																				
11:15 - 11:30																				
11:30 - 11:45																				
11:45 - 12:00																				
A.M. TOTALS	0	0	79	79	108	397	0	505	0	0	0		0	184	97	281	108	581	176	865
12:00 - 12:15																				
12:15 - 12:30																				
12:30 - 12:45																				
12:45 - 13:00																				
13:00 - 13:15																				
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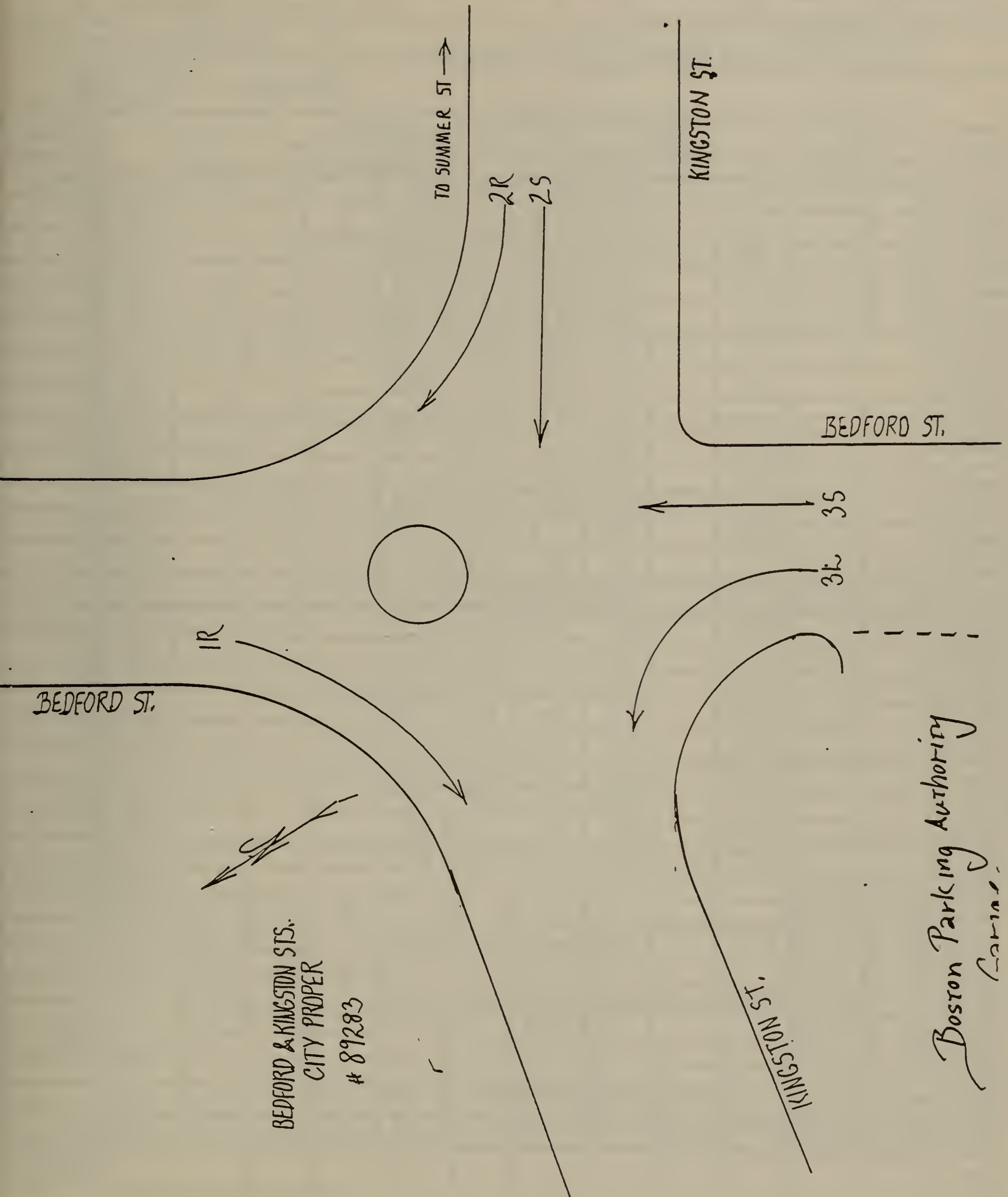
14:15 - 14:30																				
14:30 - 14:45																				
14:45 - 15:00																				
15:00 - 15:15																				
15:15 - 15:30																				
15:30 - 15:45			31	31	18	23		41						70	16	86	18	93	47	158
15:45 - 16:00			23	23	20	21		41						49	18	67	20	70	41	131
16:00 - 16:15			32	32	25	26		51						57	27	84	25	83	59	167
16:15 - 16:30			30	30	17	15		32						47	34	81	17	62	64	143
16:30 - 16:45			41	41	20	36		56						72	19	91	20	108	60	188
16:45 - 17:00			36	36	17	30		47						63	22	85	17	93	58	168
17:00 - 17:15			51	51	17	27		44						64	28	92	17	91	79	187
17:15 - 17:30			45	45	14	32		46						77	30	107	14	109	75	198
17:30 - 17:45			47	47	19	23		42						59	26	85	19	82	73	174
17:45 - 18:00			41	41	9	32		41						72	35	107	9	104	76	189
P.M. TOTALS	0	0	377	377	176	265	0	441	0	0	0		0	630	255	885	176	895	632	1,703
DAILY TOTALS	0	0	456	456	284	662	0	946	0	0	0		0	814	352	1,166	284	1,476	808	2,568
Peak AM 60-min totals (8:00 - 9:00):																				
	0	0	43	43	57	249	0	306	0	0	0	0	0	99	67	166	57	348	110	515
Peak PM 60-min totals (17:00 - 18:00):																				
	0	0	184	184	59	114	0	173	0	0	0	0	0	272	119	391	59	386	303	748

TRAFFIC MOVEMENT SUMMARY TABLE

Project: KINGSTON-BEDFORD CIR | Project number: 6367.00

Muncipality: BOSTON | Date: 9/13/86 | .: SATURDAY | Weather: CLEAR | By: MED
Intersection: BEDFORD/KINGSTON
Vehicle Type: ALL

	EB on BEDFORD				WB on BEDFORD				NB on NA				SB on KINGSTON				TOTALS			
Period	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL
7:00 - 7:15																				
7:15 - 7:30																				
7:30 - 7:45																				
7:45 - 8:00																				
8:00 - 8:15																				
8:15 - 8:30																				
8:30 - 8:45																				
8:45 - 9:00																				
9:00 - 9:15																				
9:15 - 9:30																				
9:30 - 9:45																				
9:45 - 10:00																				
10:00 - 10:15																				
10:15 - 10:30																				
10:30 - 10:45																				
10:45 - 11:00																				
11:00 - 11:15																				
11:15 - 11:30																				
11:30 - 11:45																				
11:45 - 12:00																				
A.M. TOTALS	0	0	0		0	0	0		0	0			0	0	0		0	0	0	0
12:00 - 12:15																				
12:15 - 12:30																				
12:30 - 12:45																				
12:45 - 13:00																				
13:00 - 13:15			31	31	21	37		58						25	33	58	21	62	64	147
13:15 - 13:30			36	36	21	32		53						36	27	63	21	68	63	152
13:30 - 13:45			41	41	23	24		47						41	21	62	23	65	62	150
13:45 - 14:00			19	19	15	46		61						26	31	57	15	72	50	137
14:00 - 14:15			34	34	23	36		59						32	29	61	23	68	63	154
14:15 - 14:30			35	35	21	34		55						42	37	79	21	76	72	169
14:30 - 14:45			36	36	21	30		51						39	24	63	21	69	60	150
14:45 - 15:00			17	17	23	28		51						48	35	83	23	76	52	151
15:00 - 15:15			28	28	27	36		63						31	29	60	27	67	57	151
15:15 - 15:30			33	33	16	27		43						32	20	52	16	59	53	128
15:30 - 15:45			21	21	14	20		34						36	27	63	14	56	48	118.
15:45 - 16:00			13	13	9	37		46						30	22	52	9	67	35	111
16:00 - 16:15																				
16:15 - 16:30																				
16:30 - 16:45																				
16:45 - 17:00																				
17:00 - 17:15																				
17:15 - 17:30																				
17:30 - 17:45																				
17:45 - 18:00																				
P.M. TOTALS	0	0	344	344	234	387	0	621	0	0			0	418	335	753	234	805	679	1,718
DAILY TOTALS	0	0	344		234	387	0		0	0			0	418	335		234	805	679	0
Peak AM 60-min totals (7:00 - 8:00):																				
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak PM 60-min totals (14:00 - 15:00):																				
	0	0	122	122	88	128	0	216	0	0	0	0	0	161	125	286	88	289	247	624



BEDFORD & KINGSTON STS.
CITY PROPER
89283

Leo Sullivan [illegible]-1006

STA. NO. __

TRAFFIC MOVEMENT SUMMARY TABLE

LOCATION Bedford & Kingston Sts CITY OR TOWN City Proper

DATE 11/21 & 11/22/88 DAY OF WEEK TUES AM MON PM WEATHER windy 40° RECORDER JB

#89283

TIME STARTS __ M	Bedford St southbound			Kingston St. Westbound			Bedford St Northbound						TOTAL HALF HOURLY TALLY
			1R		2S	2R	3L	3S					
7:00-7:30			16		38	13	26	25					
7:30-8:00			31		92	27	44	90					
8:00-8:30			44		58	49	32	141					
8:30-9:00			39		98	55	31	142					
9:00-9:30			16		57	34	35	89					
9:30-10:00			35		80	54	21	143					
0:00-10:30			52		78	50	42	140					
0:30-11:00			30		92	76	44	78					
1:00-11:30			33		74	52	50	111					
1:30-12:00			61		101	66	58	89					
2:00-12:30			43		85	62	47	107					
2:30-1:00			34		61	50	39	121	3				
1:00-1:30			28		60	42	47	74	0				
1:30-2:00			57		51	45	32	79					
2:00-2:30			55		93	49	36	76					
2:30-3:00			40		138	66	38	86					
3:00-3:30			44		116	64	46	78					
3:30-4:00			39		130	69	46	73					
4:00-4:30			58		128	53	36	67					
4:30-5:00			61		149	74	54	75					
:00-5:30			97		201	76	62	85					
:30-6:00			59		163	65	48	94					
:00-6:30													
:30-7:00													
:00-7:30			83		156	104	63	253					
:30-8:00													
:00-8:30			153		350	150	116	160					
:30-9:00													
:00-9:30													
:30-10:00													
:00-10:30													
:30-11:00													
TOTAL													GRAND TOTAL
TOTAL OF S & R													

TRAFFIC MOVEMENT SUMMARY TABLE

Project: KINGSTON-BEDFORD EIR
Project number: 6367.00

Muncipality: BOSTON
Date: 9/4/86
Day: THURSDAY
Weather: CLOUDY
By: DS
Intersection: BEDFORD/CHAUNCY/LAFAYETTE GARAGE
Vehicle Type: ALL

	EB on GARAGE EXIT				WB on BEDFORD				NB on CHAUNCY				SB on NA				TOTALS			
Period	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL
7:00 - 7:15	0	2	2	4	20	12	9	41	0	24	6	30					20	38	17	75
7:15 - 7:30	2	2	2	6	20	12	6	38	1	20.	8	29					23	34	16	73
7:30 - 7:45	1	3	2	6	22	11	13	46	1	35	5	41					24	49	20	93
7:45 - 8:00	3	4	2	9	19	20	14	53	1	28	9	38					23	52	25	100
8:00 - 8:15	1	2	0	3	31	26	12	69	7	44	11	62					39	72	23	134
8:15 - 8:30	0	2	0	2	41	21	14	76	5	36	5	46					46	59	19	124
8:30 - 8:45	1	2	0	3	46	22	11	79	1	48	13	62					48	72	24	144
8:45 - 9:00	0	2	0	2	38	39	16	93	3	43	9	55					41	84	25	150
9:00 - 9:15																				
9:15 - 9:30																				
9:30 - 9:45																				
9:45 - 10:00																				
10:00 - 10:15																				
10:15 - 10:30																				
10:30 - 10:45																				
10:45 - 11:00																				
11:00 - 11:15																				
11:15 - 11:30																				
11:30 - 11:45																				
11:45 - 12:00																				
A.M. TOTALS	8	19	8	35	237	163	95	495	19	278	66	363	0	0	0		264	460	169	893
12:00 - 12:15																				
12:15 - 12:30																				
12:30 - 12:45																				
12:45 - 13:00																				
13:00 - 13:15																				
13:15 - 13:30																				
13:30 - 13:45																				
13:45 - 14:00																				
14:00 - 14:15																				
14:15 - 14:30																				
14:30 - 14:45																				
14:45 - 15:00																				
15:00 - 15:15																				
15:15 - 15:30																				
15:30 - 15:45	0	1	9	10	13	7	22	42	1	40	12	53					14	48	43	105
15:45 - 16:00	2	7	0	9	26	9	21	56	8	22	12	42					36	38	33	107
16:00 - 16:15	37	2	19	58	6	17	4	27	14	52	1	67					57	71	24	152
16:15 - 16:30	27	3	14	44	8	13	1	22	1	39	22	62					36	55	37	128
16:30 - 16:45	31	2	11	44	5	13	1	19	1	45	25	71					37	60	37	134
16:45 - 17:00	5	19	1	25	38	4	13	55	0	40	10	50					43	63	24	130
17:00 - 17:15	8	23	2	33	22	2	18	42	0	42	16	58					30	67	36	133
17:15 - 17:30	5	25	2	32	22	4	8	34	0	48	12	60					27	77	22	126
17:30 - 17:45	10	22	1	33	32	3	13	48	1	52	14	67					43	77	28	148
17:45 - 18:00	6	17	0	23	31	4	7	42	0	44	8	52					37	65	15	117
P.M. TOTALS	131	121	59	311	203	76	108	387	26	424	132	582	0	0	0		360	621	299	1,280
DAILY TOTALS	139	140	67	346	440	239	203	882	45	702	198	945	0	0	0		624	1,081	468	2,173

Peak AM 60-min totals (8:00 - 9:00):

2	8	0	10	156	108	53	317	16	171	38	225	0	0	0	0	174	287	91	552

Peak PM 60-min totals (16:00 - 17:00):

100	26	45	171	57	47	19	123	16	176	58	250	0	0	0	0	173	249	122	544

TRAFFIC MOVEMENT SUMMARY TABLE

Project: KINGSTON-BEDFORD EIR | Project number: 6367.00

Muncipality: BOSTON | Date: 9/13/86 | Day: SATURDAY | Weather: CLOUDY | By: MED
Intersection: BEDFORD/CHAUNCY/LAFAYETTE GARAGE
Vehicle Type: ALL

	EB on GARAGE EXIT				WB on BEDFORD				NB on CHAUNCY				SB on NA				TOTALS			
Period	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL
7:00 - 7:15																				
7:15 - 7:30																				
7:30 - 7:45																				
7:45 - 8:00																				
8:00 - 8:15																				
8:15 - 8:30																				
8:30 - 8:45																				
8:45 - 9:00																				
9:00 - 9:15																				
9:15 - 9:30																				
9:30 - 9:45																				
9:45 - 10:00																				
10:00 - 10:15																				
10:15 - 10:30																				
10:30 - 10:45																				
10:45 - 11:00																				
11:00 - 11:15																				
11:15 - 11:30																				
11:30 - 11:45																				
11:45 - 12:00																				
A.M. TOTALS	0	0	0		0	0	0		0	0	0		0	0	0		0	0	0	0
12:00 - 12:15																				
12:15 - 12:30																				
12:30 - 12:45																				
12:45 - 13:00																				
13:00 - 13:15	0	2	1	3	37	6	17	60	2	23	24	49					39	31	42	112
13:15 - 13:30	0	12	1	13	31	5	20	56	1	24	18	43					32	41	39	112
13:30 - 13:45	2	11	1	14	54	11	35	100	3	27	19	49					59	49	55	163
13:45 - 14:00	2	3	0	5	41	7	17	65	1	30	12	43					44	40	29	113
14:00 - 14:15	2	7	1	10	45	3	13	61	2	31	31	64					49	41	45	135
14:15 - 14:30	3	9	1	13	40	9	24	73	4	29	24	57					47	47	49	143
14:30 - 14:45	1	7	0	8	32	3	15	50	0	28	17	45					33	38	32	103
14:45 - 15:00	2	1	0	3	34	2	22	58	0	27	13	40					36	30	35	101
15:00 - 15:15	2	2	2	6	26	12	17	55	3	15	27	45					31	29	46	106
15:15 - 15:30	2	4	1	7	30	4	15	49	1	20	20	41					33	28	36	97
15:30 - 15:45	5	6	1	12	23	5	15	43	0	37	9	46					28	48	25	101
15:45 - 16:00	2	4	1	7	30	1	11	42	1	25	5	31					33	30	17	80
16:00 - 16:15																				
16:15 - 16:30																				
16:30 - 16:45																				
16:45 - 17:00																				
17:00 - 17:15																				
17:15 - 17:30																				
17:30 - 17:45																				
17:45 - 18:00																				
P.M. TOTALS	23	68	10	101	423	68	221	712	18	316	219	553	0	0	0		464	452	450	1,366
DAILY TOTALS	23	68	10		423	68	221		18	316	219		0	0	0		464	452	450	0
Peak AM 60-min totals (7:00 - 8:00):																				
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak PM 60-min totals (13:30 - 14:30):																				
	9	30	3	42	180	30	89	299	10	117	86	213	0	0	0	0	199	177	178	554

TRAFFIC MOVEMENT SUMMARY TABLE

Project: KINGSTON-BEDFORD EIR

Project number: 6367.00

Muncipality: BOSTON
Date: 9/10/86
Day: WEDNESDAY
Weather: CLEAR
By: OS

Intersection: ESSEX/SURFACE ARTERY/LINCOLN

Vehicle Type: ALL

	EB on ESSEX				WB on LINCOLN				NB on SURFACE ARTERY				SB on SURFACE ARTERY				TOTALS			
Period	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL
7:00 - 7:15	58	9	9	76	3	92	47	142	7	70	2	79	1	142	0	143	69	313	58	440
7:15 - 7:30	67	4	21	92	6	111	46	163	7	78	0	85	4	154	5	163	84	347	72	503
7:30 - 7:45	93	5	33	131	4	128	75	207	17	70	0	87	8	178	3	189	122	381	111	614
7:45 - 8:00	69	6	26	101	2	154	58	214	3	60	2	65	11	113	6	130	85	333	92	510
8:00 - 8:15	97	6	25	128	4	151	57	212	12	111	4	127	20	86	19	125	133	354	105	592
8:15 - 8:30	75	4	25	104	11	107	49	167	12	72	3	87	17	112	21	150	115	295	98	508
8:30 - 8:45	85	15	27	127	4	167	72	243	24	107	4	135	22	112	22	156	135	401	125	661
8:45 - 9:00	94	8	38	140	4	107	37	148	25	90	4	119	9	116	11	136	132	321	90	543
9:00 - 9:15																				
9:15 - 9:30																				
9:30 - 9:45																				
9:45 - 10:00																				
10:00 - 10:15																				
10:15 - 10:30																				
10:30 - 10:45																				
10:45 - 11:00																				
11:00 - 11:15																				
11:15 - 11:30																				
11:30 - 11:45																				
11:45 - 12:00																				
A.M. TOTALS	638	57	204	899	38	1017	441	1,496	107	658	19	784	92	1013	87	1,192	875	2,745	751	4,371
12:00 - 12:15																				
12:15 - 12:30																				
12:30 - 12:45																				
12:45 - 13:00																				
13:00 - 13:15																				
13:15 - 13:30																				
13:30 - 13:45																				
13:45 - 14:00																				
14:00 - 14:15																				
14:15 - 14:30																				
14:30 - 14:45																				
14:45 - 15:00																				
15:00 - 15:15																				
15:15 - 15:30																				
15:30 - 15:45	148	5	71	224	8	75	96	179	6	162	2	170	6	218	7	231	168	460	176	804
15:45 - 16:00	94	4	45	143	6	68	97	171	11	163	4	178	6	247	1	254	117	482	147	746
16:00 - 16:15	117	2	70	189	7	52	90	149	21	177	1	199	3	244	2	249	148	475	163	786
16:15 - 16:30	88	4	56	148	6	57	100	163	10	166	1	177	2	246	3	251	106	473	160	739
16:30 - 16:45	115	8	89	212	12	68	94	174	23	182	3	208	0	193	0	193	150	451	186	787
16:45 - 17:00	112	16	85	213	9	76	104	189	11	190	0	201	2	226	1	229	134	508	190	832
17:00 - 17:15	128	1	82	211	8	46	15	69	27	167	0	194	1	260	7	268	164	474	104	742
17:15 - 17:30	101	4	62	167	0	67	38	105	18	163	0	181	5	285	2	292	124	519	102	745
17:30 - 17:45	121	4	89	214	2	48	32	82	19	167	5	191	3	281	1	285	145	500	127	772
17:45 - 18:00	113	6	88	207	4	54	64	122	26	217	12	255	4	265	0	269	147	542	164	853
P.M. TOTALS	1137	54	737	1,928	62	611	730	1,403	172	1754	28	1,954	32	2465	24	2,521	1,403	4,884	1,519	7,906
DAILY TOTALS	1775	111	941	2,827	100	1628	1171	2,899	279	2412	47	2,738	124	3478	111	3,713	2,278	7,629	2,270	12,177

Peak AM 60-min totals (8:00 - 9:00):

351	33	115	499	23	532	215	770	73	380	15	468	68	426	73	567	515	1,371	418	2,304

Peak PM 60-min totals (16:00 - 17:00):

TRAFFIC MOVEMENT SUMMARY TABLE

Project: KINGSTON-BEDFORD EIR
Project number: 6367.00

Muncipality: BOSTON
Date: 9/6/86
Day: SATURDAY
Weather: CLEAR
By: MED
Intersection: ESSEX/SURFACE ARTERY/LINCOLN
Vehicle Type: ALL

	EB on ESSEX				WB on LINCOLN				NB on SURFACE ARTERY				SB on SURFACE ARTERY				TOTALS			
Period	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL
7:00 - 7:15																				
7:15 - 7:30																				
7:30 - 7:45																				
7:45 - 8:00																				
8:00 - 8:15																				
8:15 - 8:30																				
8:30 - 8:45																				
8:45 - 9:00																				
9:00 - 9:15																				
9:15 - 9:30																				
9:30 - 9:45																				
9:45 - 10:00																				
10:00 - 10:15																				
10:15 - 10:30																				
10:30 - 10:45																				
10:45 - 11:00																				
11:00 - 11:15																				
11:15 - 11:30																				
11:30 - 11:45																				
11:45 - 12:00																				
A.M. TOTALS	0	0	0		0	0	0		0	0	0		0	0	0		0	0	0	0
12:00 - 12:15																				
12:15 - 12:30																				
12:30 - 12:45																				
12:45 - 13:00																				
13:00 - 13:15	96	6	27	129									7	103	8	118	103	109	35	247
13:15 - 13:30	73	8	24	105	7	41	33	81	19	83	0	102	2	95	7	104	101	227	64	392
13:30 - 13:45	70	2	44	116	6	45	26	77	9	90	2	101	4	109	2	115	89	246	74	409
13:45 - 14:00	80	5	50	135	10	62	20	92	10	89	1	100	1	107	11	119	101	263	82	446
14:00 - 14:15	94	3	33	130	13	64	28	105	20	93	1	114	2	90	8	100	129	250	70	449
14:15 - 14:30	82	6	45	133	9	34	19	62	7	63	0	70	4	137	3	144	102	240	67	409
14:30 - 14:45	104	3	32	139	6	24	17	47	3	45	0	48	2	90	7	99	115	162	56	333
14:45 - 15:00	88	5	52	145	5	20	15	40	13	48	1	62	7	126	3	136	113	199	71	383
15:00 - 15:15	90	3	33	126	3	55	36	94	20	91	0	111	6	100	1	107	119	249	70	438
15:15 - 15:30	98	3	51	152	9	84	28	121	18	184	1	203	1	146	1	148	126	417	81	624
15:30 - 15:45	109	2	74	185	8	38	27	73	11	105	0	116	2	136	7	145	130	281	108	519
15:45 - 16:00					4	40	47	91	11	85	0	96	3	144	6	153	18	269	53	340
16:00 - 16:15																				
16:15 - 16:30																				
16:30 - 16:45																				
16:45 - 17:00																				
17:00 - 17:15																				
17:15 - 17:30																				
17:30 - 17:45																				
17:45 - 18:00																				
P.M. TOTALS	984	46	465	1,495	80	507	296	883	141	976	6	1,123	41	1383	64	1,488	1,246	2,912	831	4,989
DAILY TOTALS	984	46	465		80	507	296		141	976	6		41	1383	64		1,246	2,912	831	0

Peak AM 60-min totals (7:00 - 8:00):

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Peak PM 60-min totals (14:45 - 15:45):

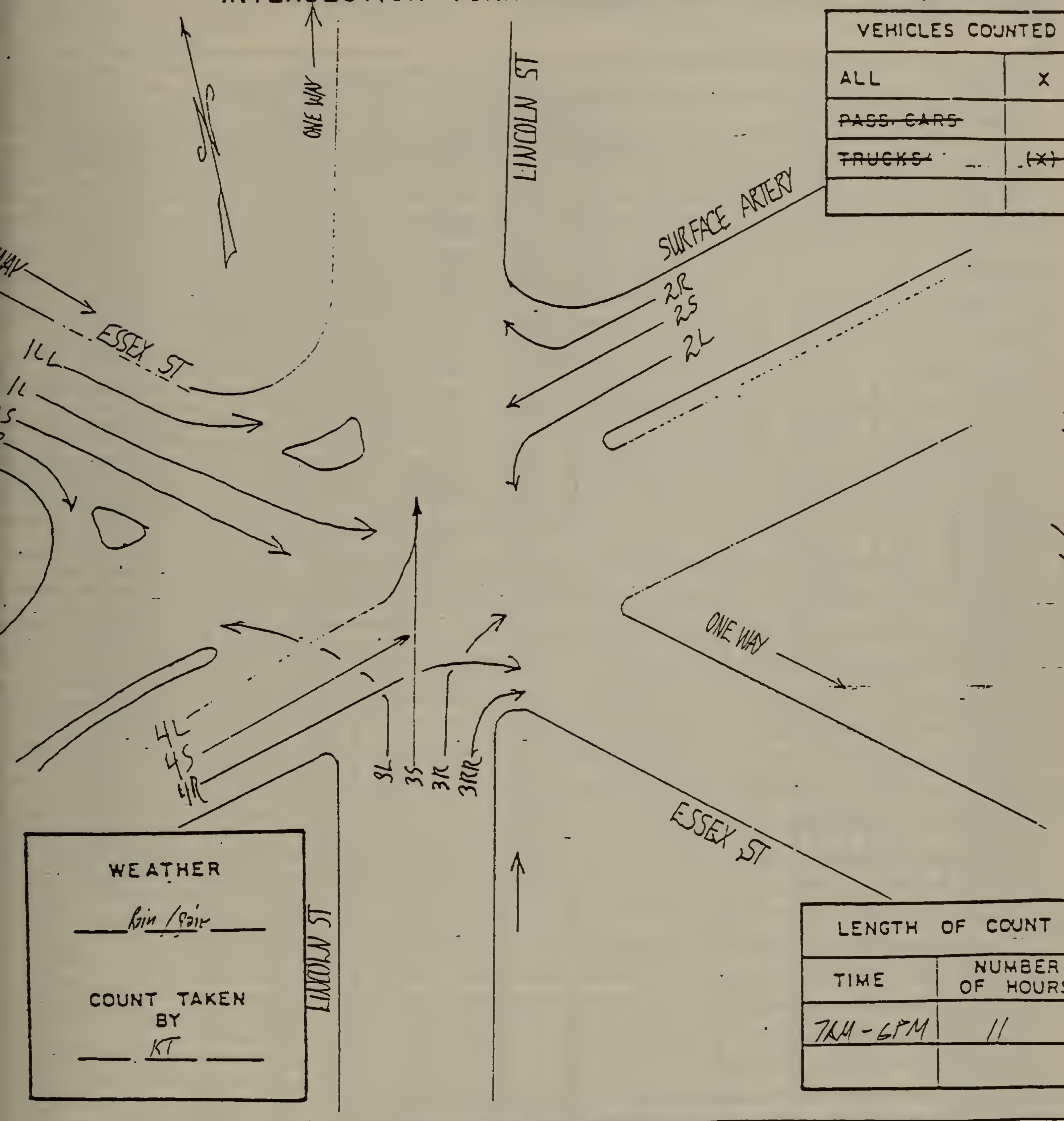
385	13	210	608	25	197	106	328	62	428	2	492	16	508	12	536	488	1,146	330	1,964

INT. NO. #1241

Essex/Lincoln/Surface Artery
City Proper
DATE 3/14 & 16/88 DAY OF WEEK M/W

INTERSECTION TURNING MOVEMENT COUNT #88166

VEHICLES COUNTED	
ALL	X
~~PASS. CARS~~	
~~TRUCKS~~	~~(X)~~



WEATHER
Rain / fair

COUNT TAKEN BY
KT

LENGTH OF COUNT	
TIME	NUMBER OF HOURS
7AM - 6PM	11

STREET		ENTERING VOLUME	FLOW PERCENT
1) Essex St	Eastbound	8109	27.08
2) Surface Artery	Southbound	8981	30.00
3) Lincoln St	Northbound	6868	22.94
4) Surface Artery	Northbound	5981	19.98
		29939	100.000

COMMENTS

AFFIC MOVEMENT SUMMARY TABL

ION Essex St – Lincoln St & Surface Artery – – CITY OR TOWN City Proper – –

TE 3/14+16/88 – – DAY OF WEEK Mon/Wed – WEATHER Rain/Fair – RECORDER KT – –

# 88166 192

TIME STARTS __M	Essex St.				Surface Artery			Lincoln St					TOTA HALF HO TALL
	Eastbound				Southbound			Northbound					
	1LL	1L	1S	1R	2L	2S	2R	3L	3S	3R	3RR		
7:00-7:30	30	129	16	34	4	216	9	15	252	80	6	–	- 79
7:30-8:00	81	180	24	35	30	281	3	14	225	101	4		9
8:00-8:30	33	248	59	51	44	405	4	36	390	139	15		14
8:30-9:00	44	151	17	57	28	330	8	34	303	147	17		11
9:00-9:30	26	162	41	53	23	256	7	27	288	119	11		10
9:30-10:00	31	156	35	72	18	308	5	19	233	88	7		9
10:00-10:30	48	219	32	93	26	331	2	18	197	73	2		10
10:30-11:00	59	302	66	118	22	444	4	22	186	131	14		13
11:00-11:30	28	217	22	103	21	408	3	10	135	60	13		10
11:30-12:00	24	324	21	79	33	375	6	23	121	52	15		10
12:00-12:30	21	161	24	59	17	303	2	13	119	51	8		7
12:30-1:00	34	202	32	74	30	391	4	19	204	111	13		111
1:00-1:30	29	180	40	69	19	298	6	25	141	77	9		8
1:30-2:00	36	195	27	55	27	313	5	8	166	93	14		9
2:00-2:30	27	188	35	48	28	367	5	20	188	69	14		9
2:30-3:00	30	174	47	22	16	388	6	14	126	104	7		9
3:00-3:30	31	210	61	33	10	492	5	22	197	140	7		12
3:30-4:00	47	213	76	102	28	403	7	11	148	161	6		12
4:00-4:30	48	211	62	121	22	389	6	12	113	139	5		11
4:30-5:00	56	262	37	144	15	622	4	21	99	91	4		13
5:00-5:30	66	218	39	150	20	555	3	13	101	116	8		128
5:30-6:00	42	305	31	215	16	501	4	10	88	99	4		131
6:00-6:30													
6:30-7:00													
7:00-7:30	AM/[illegible]	428	[illegible]	[illegible]	74	[illegible]	7	[illegible]	[illegible]	[illegible]	[illegible]		
7:30-8:00													
8:00-8:30													
8:30-9:00	PM/[illegible]	[illegible]	76	[illegible]	35	[illegible]	7	[illegible]	[illegible]	[illegible]	[illegible]		
9:00-9:30													
9:30-10:00													
10:00-10:30													
10:30-11:00													
TOTAL	871	4607	844	1787	497	8376	108	406	4020	2239	203		GRAN TOTA
TOTAL OF L S & R													23958

AFFIC MOVEMENT SUMMARY TABLE

ON *Essex St, Lincoln St & Surface Artery* __ CITY OR TOWN *City Proper*

E *3/14+16/88* __ DAY OF WEEK *Mon/Wed* _ WEATHER *Rain/Fair* RECORDER *KT* _ 2 of 2

#88166

TIME STARTS __ M	P&1		Surface Artery Northbound										TOTAL HALF HOUR TALLY
	Sub Total		4L	4S	4R								
:00-7:30	791		29	141	30								991
:30-8:00	978		21	217	7								1223
:00-8:30	1422		16	274	5								1717
:30-9:00	1136		43	228	13								1420
:00-9:30	1013		28	211	14								1266
:30-10:00	972		27	181	26								1206
:00-10:30	1041		20	208	11								1280
:30-11:00	1368		14	210	5								1597
00-11:30	1020		18	193	6								1237
:30-12:00	1073		10	261	4								1348
:00-12:30	778		12	216	17								1023
:30-1:00	1114		15	259	16								1404
00-1:30	893		13	226	10								1142
30-2:00	939		12	234	8								1193
00-2:30	989		11	229	7								1236
30-3:00	934		12	244	4								1194
00-3:30	1208		4	302	3								1522
30-4:00	1202		22	274	5								1503
00-4:30	1128		38	259	3								1428
30-5:00	1355		26	265	6								1652
00-5:30	1289		11	414	7								1721
30-6:00	1315		28	288	5								1636
00-6:30													
30-7:00			[illegible]	401	[illegible]								
00-7:30													
30-8:00			[illegible]	679	[illegible]								
00-8:30													
30-9:00													
00-9:30													
30-10:00													
00-10:30													
30-11:00													
OTAL	23958		435	5334	212								GRAND TOTAL
OTAL OF S & R													29939

TRAFFIC MOVEMENT SUMMARY TABLE

Project: KINGSTON-BEDFORD EIR | Project number: 6367.00

Muncipality: BOSTON | Date: 9/10/86 | Day: WEDNESDAY | Weather: CLEAR | By: MED
Intersection: ESSEX/COLUMBIA AND LINCOLN
Vehicle Type: ALL

	EB on ESSEX to COLUMBIA				EB on ESSEX to LINCOLN				NA on NA				NA on NA				TOTALS			
Period	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL
7:00 - 7:15	3			3	12			12									15			15
7:15 - 7:30	1			1	18			18									19			19
7:30 - 7:45	3			3	21			21									24			24
7:45 - 8:00	1			1	16			16									17			17
8:00 - 8:15	2			2	29			29									31			31
8:15 - 8:30	4			4	18			18									22			22
8:30 - 8:45	6			6	25			25									31			31
8:45 - 9:00	10			10	18			18									28			28
9:00 - 9:15																				
9:15 - 9:30																				
9:30 - 9:45																				
9:45 - 10:00																				
10:00 - 10:15																				
10:15 - 10:30																				
10:30 - 10:45																				
10:45 - 11:00																				
11:00 - 11:15																				
11:15 - 11:30																				
11:30 - 11:45																				
11:45 - 12:00																				
A.M. TOTALS	30	0	0	30	157	0	0	157	0	0	0		0	0	0		187	0	0	187
12:00 - 12:15																				
12:15 - 12:30																				
12:30 - 12:45																				
12:45 - 13:00																				
13:00 - 13:15																				
13:15 - 13:30																				
13:30 - 13:45																				
13:45 - 14:00																				
14:00 - 14:15																				
14:15 - 14:30																				
14:30 - 14:45																				
14:45 - 15:00																				
15:00 - 15:15																				
15:15 - 15:30																				
15:30 - 15:45	0				20			20									20			20
15:45 - 16:00	0				19			19									19			19
16:00 - 16:15	1			1	19			19									20			20
16:15 - 16:30	2			2	20			20									22			22
16:30 - 16:45	0				14			14									14			14
16:45 - 17:00	0				39			39									39			39
17:00 - 17:15	2			2	35			35									37			37
17:15 - 17:30	0				20			20									20			20
17:30 - 17:45	4			4	25			25									29			29
17:45 - 18:00	0				37			37									37			37
P.M. TOTALS	9	0	0	9	249	0	0	249	0	0	0		0	0	0		257	0	0	257
DAILY TOTALS	39	0	0	39	405	0	0	405	0	0	0		0	0	0		444	0	0	444
Peak AM 60-min totals (8:00 - 9:00):																				
	22	0	0	22	90	0	0	90	0	0	0	0	0	0	0	0	112	0	0	112
Peak PM 60-min totals (16:45 - 17:45):																				
	6	0	0	6	119	0	0	119	0	0	0	0	0	0	0	0	125	0	0	125

TRAFFIC MOVEMENT SUMMARY TABLE

Project: KINGSTON-BEDFORD EIR | Project number: 6367.00

Muncipality: BOSTON | Date: 9/6/86 | Day: SATURDAY | Weather: CLEAR | By: MED
Intersection: ESSEX/COLUMBIA AND LINCOLN
Vehicle Type: ALL

	EB on ESSEX to COLUMBIA				EB on ESSEX to LINCOLN				NA on NA-				NA on NA				TOTALS			
Period	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL
7:00 - 7:15																				
7:15 - 7:30																				
7:30 - 7:45																				
7:45 - 8:00																				
8:00 - 8:15																				
8:15 - 8:30																				
8:30 - 8:45																				
8:45 - 9:00																				
9:00 - 9:15																				
9:15 - 9:30																				
9:30 - 9:45																				
9:45 - 10:00																				
10:00 - 10:15																				
10:15 - 10:30																				
10:30 - 10:45																				
10:45 - 11:00																				
11:00 - 11:15																				
11:15 - 11:30																				
11:30 - 11:45																				
11:45 - 12:00																				
A.M. TOTALS	0	0	0		0	0	0		0	0	0		0	0	0		0	0	0	0
12:00 - 12:15																				
12:15 - 12:30																				
12:30 - 12:45																				
12:45 - 13:00																				
13:00 - 13:15	0				9			9									9			9
13:15 - 13:30	0				10			10									10			10
13:30 - 13:45	0				6			6									6			6
13:45 - 14:00	5			5	4			4									9			9
14:00 - 14:15	2			2	11			11									13			13
14:15 - 14:30	0				7			7									7			7
14:30 - 14:45	1			1	7			7									8			8
14:45 - 15:00	0				11			11									11			11
15:00 - 15:15	0				8			8									8			8
15:15 - 15:30	0				10			10									10			10
15:30 - 15:45	0				7			7									7			7
15:45 - 16:00																				
16:00 - 16:15																				
16:15 - 16:30																				
16:30 - 16:45																				
16:45 - 17:00																				
17:00 - 17:15																				
17:15 - 17:30																				
17:30 - 17:45																				
17:45 - 18:00																				
P.M. TOTALS	8	0	0	8	90	0	0	90	0	0	0		0	0	0		98	0	0	98
DAILY TOTALS	8	0	0		90	0	0		0	0	0		0	0	0		98	0	0	0

Peak AM 60-min totals (7:00 - 8:00):

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Peak PM 60-min totals (14:00 - 15:00):

3	0	0	3	36	0	0	36	0	0	0	0	0	0	0	0	39	0	0	39

TRAFFIC MOVEMENT SUMMARY TABLE

Project: KINGSTON-BEDFORD EIR | Project number: 6367.00

Muncipality: BOSTON | Date: 9/9/86 | Day: TUESDAY | Weather: CLEAR | By: MED
Intersection: ESSEX/KINGSTON/DELAFAYETTE
Vehicle Type: ALL

	EB on ESSEX				WB on NA				NB on NA				SB on KINGSTON				TOTALS			
Period	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL
7:00 - 7:15	1	65	6	72									4	4	17	25	5	69	23	97
7:15 - 7:30	3	20	2	25									8	22	14	44	11	42	16	69
7:30 - 7:45	1	100	3	104									16	17	4	37	17	117	7	141
7:45 - 8:00	1	108	8	117									26	14	5	45	27	122	13	162
8:00 - 8:15	1	124	9	134									26	23	6	55	27	147	15	189
8:15 - 8:30	3	114	6	123									29	23	5	57	32	137	11	180
8:30 - 8:45	3	112	4	119									29	20	13	62	32	132	17	181
8:45 - 9:00	0	81	3	84									36	17	8	61	36	98	11	145
9:00 - 9:15																				
9:15 - 9:30																				
9:30 - 9:45																				
9:45 - 10:00																				
10:00 - 10:15																				
10:15 - 10:30																				
10:30 - 10:45																				
10:45 - 11:00																				
11:00 - 11:15																				
11:15 - 11:30																				
11:30 - 11:45																				
11:45 - 12:00																				
A.M. TOTALS	13	724	41	778	0	0	0		0	0	0		174	140	72	386	187	864	113	1,164
12:00 - 12:15																				
12:15 - 12:30																				
12:30 - 12:45																				
12:45 - 13:00																				
13:00 - 13:15																				
13:15 - 13:30																				
13:30 - 13:45																				
13:45 - 14:00																				
14:00 - 14:15																				
14:15 - 14:30																				
14:30 - 14:45																				
14:45 - 15:00																				
15:00 - 15:15																				
15:15 - 15:30																				
15:30 - 15:45	2	97	12	111									69	37	19	125	71	134	31	236
15:45 - 16:00	3	136	7	146									60	39	19	118	63	175	26	264
16:00 - 16:15	3	125	7	135									63	45	10	118	66	170	17	253
16:15 - 16:30	0	113	13	126									72	32	10	114	72	145	23	240
16:30 - 16:45	2	118	9	129									97	46	27	170	99	164	36	299
16:45 - 17:00	3	119	9	131									81	39	12	132	84	158	21	263
17:00 - 17:15	3	129	16	148									87	49	22	158	90	178	38	306
17:15 - 17:30	5	136	8	149									103	54	21	178	108	190	29	327
17:30 - 17:45	3	144	8	155									85	36	21	142	88	180	29	297
17:45 - 18:00	4	163	12	179									84	44	16	144	88	207	28	323
P.M. TOTALS	28	1280	101	1,409	0	0	0		0	0	0		801	421	177	1,399	829	1,701	278	2,808
DAILY TOTALS	41	2004	142	2,187	0	0	0		0	0	0		975	561	249	1,785	1,016	2,565	391	3,972
Peak AM 60-min totals (7:45 - 8:45):																				
	8	458	27	493	0	0	0	0	0	0	0	0	110	80	29	219	118	538	56	712
Peak PM 60-min totals (17:00 - 18:00):																				
	15	572	44	631	0	0	0	0	0	0	0	0	359	183	80	622	374	755	124	1,253

TRAFFIC MOVEMENT SUMMARY TABLE

Project: KINGSTON-BEDFORD EIR　Project number: 6367.00

Muncipality: BOSTON　Date: '9/6/86　Day: SATURDAY　Weather: CLEAR　By: DS
Intersection: ESSEX/KINGSTON/DELAFAYETTE
Vehicle Type: ALL

Period	EB on ESSEX				WB on NA				NB on NA				SB on KINGSTON				TOTALS			
	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL
7:00 - 7:15																				
7:15 - 7:30																				
7:30 - 7:45																				
7:45 - 8:00																				
8:00 - 8:15																				
8:15 - 8:30																				
8:30 - 8:45																				
8:45 - 9:00																				
9:00 - 9:15																				
9:15 - 9:30																				
9:30 - 9:45																				
9:45 - 10:00																				
10:00 - 10:15																				
10:15 - 10:30																				
10:30 - 10:45																				
10:45 - 11:00																				
11:00 - 11:15																				
11:15 - 11:30																				
11:30 - 11:45																				
11:45 - 12:00																				
A.M. TOTALS	0	0	0		0	0	0		0	0	0		0	0	0		0	0	0	0
12:00 - 12:15																				
12:15 - 12:30																				
12:30 - 12:45																				
12:45 - 13:00																				
13:00 - 13:15	7	121	6	134									28	31	25	84	35	152	31	218
13:15 - 13:30	3	105	11	119									33	13	24	70	36	118	35	189
13:30 - 13:45	4	96	8	108									41	20	19	80	45	116	27	188
13:45 - 14:00	7	121	11	139									44	30	27	101	51	151	38	240
14:00 - 14:15	2	116	14	132									25	28	26	79	27	144	40	211
14:15 - 14:30	0	106	25	131									47	35	26	108	47	141	51	239
14:30 - 14:45	3	108	12	123									39	33	20	92	42	141	32	215
14:45 - 15:00	2	133	24	159									51	30	24	105	53	163	48	264
15:00 - 15:15	5	130	5	140									52	28	27	107	57	158	32	247
15:15 - 15:30	3	144	9	156									45	35	20	100	48	179	29	256
15:30 - 15:45	2	128	9	139									37	20	17	74	39	148	26	213
15:45 - 16:00	6	114	7	127									43	31	14	88	49	145	21	215
16:00 - 16:15																				
16:15 - 16:30																				
16:30 - 16:45																				
16:45 - 17:00																				
17:00 - 17:15																				
17:15 - 17:30																				
17:30 - 17:45																				
17:45 - 18:00																				
P.M. TOTALS	44	1422	141	1,607	0	0	0		0	0	0		485	334	269	1,088	529	1,756	410	2,695
DAILY TOTALS	44	1422	141		0	0	0		0	0	0		485	334	269		529	1,756	410	0

Peak AM 60-min totals (7:00 - 8:00):

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Peak PM 60-min totals (14:30 - 15:30):

13	515	50	578	0	0	0	0	0	0	0	0	187	126	91	404	200	641	141	982

```
TRAFFIC MOVEMENT SUMMARY TABLE
------------------------------------------------------------------------------------------------------------------------
Project:      KINGSTON-BEDFORD EIR                                                            Project number: 6367.00
------------------------------------------------------------------------------------------------------------------------
Muncipality:  BOSTON                                 Date:  9/9/86         Day: TUESDAY        Weather: CLEAR       By: DS
Intersection: ESSEX/CHAUNCY/HARRISON/HARRISON EXT
Vehicle Type: ALL
------------------------------------------------------------------------------------------------------------------------
               | EB on ESSEX          | WB on NA             | NB on  NA            | SB on HARRISON EXT   |         TOTALS
               |                      |                      |                      |                      |
Period         |  LT   TH   RT    ALL |  LT   TH   RT    ALL |  LT   TH   RT    ALL |  LT   TH   RT    ALL |  LT    TH   RT    ALL
========================================================================================================================
 7:00 -  7:15  |  21   66   24    111 |                      |                      |  10   10         20 |  31    76   24    131
 7:15 -  7:30  |  37  105   35    177 |                      |                      |  13    6         19 |  50   111   35    196
 7:30 -  7:45  |  43  110   25    178 |                      |                      |  14    6         20 |  57   116   25    198
 7:45 -  8:00  |  45  101   41    187 |                      |                      |   7   10         17 |  52   111   41    204
------------------------------------------------------------------------------------------------------------------------
 8:00 -  8:15  |  49  124   34    207 |                      |                      |  14   13         27 |  63   137   34    234
 8:15 -  8:30  |  37  116   30    183 |                      |                      |  16   11         27 |  53   127   30    210
 8:30 -  8:45  |  44  113   20    177 |                      |                      |  11   14         25 |  55   127   20    202
 8:45 -  9:00  |  57   78   28    163 |                      |                      |  21   13         34 |  78    91   28    197
------------------------------------------------------------------------------------------------------------------------
 9:00 -  9:15  |                      |                      |                      |                      |
 9:15 -  9:30  |                      |                      |                      |                      |
 9:30 -  9:45  |                      |                      |                      |                      |
 9:45 - 10:00  |                      |                      |                      |                      |
------------------------------------------------------------------------------------------------------------------------
10:00 - 10:15  |                      |                      |                      |                      |
10:15 - 10:30  |                      |                      |                      |                      |
10:30 - 10:45  |                      |                      |                      |                      |
10:45 - 11:00  |                      |                      |                      |                      |
------------------------------------------------------------------------------------------------------------------------
11:00 - 11:15  |                      |                      |                      |                      |
11:15 - 11:30  |                      |                      |                      |                      |
11:30 - 11:45  |                      |                      |                      |                      |
11:45 - 12:00  |                      |                      |                      |                      |
------------------------------------------------------------------------------------------------------------------------
   A.M. TOTALS | 333  813  237  1,383 |   0    0    0        |   0    0    0        | 106   83    0    189 | 439   896  237  1,572
========================================================================================================================
12:00 - 12:15  |                      |                      |                      |                      |
12:15 - 12:30  |                      |                      |                      |                      |
12:30 - 12:45  |                      |                      |                      |                      |
12:45 - 13:00  |                      |                      |                      |                      |
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13:00 - 13:15  |                      |                      |                      |                      |
13:15 - 13:30  |                      |                      |                      |                      |
13:30 - 13:45  |                      |                      |                      |                      |
13:45 - 14:00  |                      |                      |                      |                      |
------------------------------------------------------------------------------------------------------------------------
14:00 - 14:15  |                      |                      |                      |                      |
14:15 - 14:30  |                      |                      |                      |                      |
14:30 - 14:45  |                      |                      |                      |                      |
14:45 - 15:00  |                      |                      |                      |                      |
------------------------------------------------------------------------------------------------------------------------
15:00 - 15:15  |                      |                      |                      |                      |
15:15 - 15:30  |                      |                      |                      |                      |
15:30 - 15:45  |  45   91   47    183 |                      |                      |  24   32         56 |  69   123   47    239
15:45 - 16:00  |  42  111   42    195 |                      |                      |  22   32         54 |  64   143   42    249
------------------------------------------------------------------------------------------------------------------------
16:00 - 16:15  |  45  142   30    217 |                      |                      |  19   27         46 |  64   169   30    263
16:15 - 16:30  |  42   80   42    164 |                      |                      |  34   27         61 |  76   107   42    225
16:30 - 16:45  |  54  122   32    208 |                      |                      |  36   29         65 |  90   151   32    273
16:45 - 17:00  |  34  108   33    175 |                      |                      |  26   41         67 |  60   149   33    242
------------------------------------------------------------------------------------------------------------------------
17:00 - 17:15  |  56  130   55    241 |                      |                      |  42   60        102 |  98   190   55    343
17:15 - 17:30  |  48  107   36    191 |                      |                      |  51   63        114 |  99   170   36    305
17:30 - 17:45  |  47  123   43    213 |                      |                      |  56   51        107 | 103   174   43    320
17:45 - 18:00  |  50  156   33    239 |                      |                      |  58   56        114 | 108   212   33    353
------------------------------------------------------------------------------------------------------------------------
   P.M. TOTALS | 463 1170  393  2,026 |   0    0    0        |   0    0    0        | 368  418    0    786 | 831 1,588  393  2,812
========================================================================================================================
  DAILY TOTALS | 796 1983  630  3,409 |   0    0    0        |   0    0    0        | 474  501    0    975 |1,270 2,484 630  4,384
========================================================================================================================


   Peak AM 60-min totals ( 7:45 -  8:45):
------------------------------------------------------------------------------------------------------------------------
                175  454  125    754     0    0    0      0     0    0    0      0    48   48    0     96   223   502  125    850

   Peak PM 60-min totals (17:00 - 18:00):
------------------------------------------------------------------------------------------------------------------------
                201  516  167    884     0    0    0      0     0    0    0      0   207  230    0    437   408   746  167  1,321
```

TRAFFIC MOVEMENT SUMMARY TABLE

Project: KINGSTON-BEDFORD CIR Project number: 6367.00

Muncipality: BOSTON Date: 9/6/86 Day: SATURDAY Weather: CLEAR By: OS
Intersection: ESSEX/CHAUNCY/HARRISON/HARRISON EXT
Vehicle Type: ALL

	EB on ESSEX				WB on NA				NB on NA				SB on HARRISON EXT				TOTALS			
Period	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL
7:00 - 7:15																				
7:15 - 7:30																				
7:30 - 7:45																				
7:45 - 8:00																				
8:00 - 8:15																				
8:15 - 8:30																				
8:30 - 8:45																				
8:45 - 9:00																				
9:00 - 9:15																				
9:15 - 9:30																				
9:30 - 9:45																				
9:45 - 10:00																				
10:00 - 10:15																				
10:15 - 10:30																				
10:30 - 10:45																				
10:45 - 11:00																				
11:00 - 11:15																				
11:15 - 11:30																				
11:30 - 11:45																				
11:45 - 12:00																				
A.M. TOTALS	0	0	0		0	0	0		0	0	0		0	0	0		0	0	0	0
12:00 - 12:15																				
12:15 - 12:30																				
12:30 - 12:45																				
12:45 - 13:00																				
13:00 - 13:15	17	100	31	148									38	24		62	55	124	31	210
13:15 - 13:30	50	78	67	195									49	53		102	99	131	67	297
13:30 - 13:45	38	75	31	144									32	20		52	70	95	31	196
13:45 - 14:00	31	92	25	148									41	8		49	72	100	25	197
14:00 - 14:15	27	101	37	165									50	9		59	77	110	37	224
14:15 - 14:30	29	104	36	169									50	13		63	79	117	36	232
14:30 - 14:45	30	111	14	155									52	15		67	82	126	14	222
14:45 - 15:00	19	78	34	131									50	18		68	69	96	34	199
15:00 - 15:15	23	104	43	170									47	8		55	70	112	43	225
15:15 - 15:30	30	127	36	193									54	5		59	84	132	36	252
15:30 - 15:45	25	100	34	159									58	4		62	83	104	34	221
15:45 - 16:00	14	88	25	127									27	9		36	41	97	25	163
16:00 - 16:15																				
16:15 - 16:30																				
16:30 - 16:45																				
16:45 - 17:00																				
17:00 - 17:15																				
17:15 - 17:30																				
17:30 - 17:45																				
17:45 - 18:00																				
P.M. TOTALS	333	1158	413	1,904	0	0	0		0	0	0		548	186	0	734	881	1,344	413	2,638
DAILY TOTALS	333	1158	413		0	0	0		0	0	0		548	186	0		881	1,344	413	0

Peak AM 60-min totals (7:00 - 8:00):

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Peak PM 60-min totals (13:15 - 14:15):

146	346	160	652	0	0	0	0	0	0	0	0	172	90	0	262	318	436	160	914

TRAFFIC MOVEMENT SUMMARY TABLE

Project: KINGSTON-BEDFORD EIR

Project number: 6367.00

Muncipality: BOSTON

Intersection: ESSEX/WASHINGTON

Vehicle Type: ALL

Date: 9/4/86

Day: THURSDAY

Weather: CLOUDY

By: DS

Period	EB on ESSEX				WB on NA				NB on WASHINGTON				SB on NA				TOTALS			
	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL
7:00 - 7:15																				
7:15 - 7:30	7	92		99						36	40	76					7	128	40	175
7:30 - 7:45	10	130		140						34	51	85					10	164	51	225
7:45 - 8:00	20	122		142						42	61	103					20	164	61	245
8:00 - 8:15	23	138		161						47	71	118					23	185	71	279
8:15 - 8:30	23	128		151						63	45	108					23	191	45	259
8:30 - 8:45	27	156		183						54	58	112					27	210	58	295
8:45 - 9:00	37	112		149						72	41	113					37	184	41	262
9:00 - 9:15																				
9:15 - 9:30																				
9:30 - 9:45																				
9:45 - 10:00																				
10:00 - 10:15																				
10:15 - 10:30																				
10:30 - 10:45																				
10:45 - 11:00																				
11:00 - 11:15																				
11:15 - 11:30																				
11:30 - 11:45																				
11:45 - 12:00																				
A.M. TOTALS	147	878	0	1,025	0	0	0		0	348	367	715	0	0	0		147	1,226	367	1,740
12:00 - 12:15																				
12:15 - 12:30																				
12:30 - 12:45																				
12:45 - 13:00																				
13:00 - 13:15																				
13:15 - 13:30																				
13:30 - 13:45																				
13:45 - 14:00																				
14:00 - 14:15																				
14:15 - 14:30																				
14:30 - 14:45																				
14:45 - 15:00																				
15:00 - 15:15																				
15:15 - 15:30																				
15:30 - 15:45	24	122		146						61	62	123					24	183	62	269
15:45 - 16:00	29	138		167						56	58	114					29	194	58	281
16:00 - 16:15	26	152		178						59	70	129					26	211	70	307
16:15 - 16:30	24	169		193						54	71	125					24	223	71	318
16:30 - 16:45	30	128		158						49	52	101					30	177	52	259
16:45 - 17:00	28	180		208						64	65	129					28	244	65	337
17:00 - 17:15	25	135		160						54	68	122					25	189	68	282
17:15 - 17:30	32	135		167						50	58	108					32	195	58	275
17:30 - 17:45	33	154		187						67	58	125					33	221	58	312
17:45 - 18:00	31	150		181						57	59	116					31	207	59	297
P.M. TOTALS	282	1463	0	1,745	0	0	0		0	571	621	1,192	0	0	0		282	2,034	621	2,937
DAILY TOTALS	429	2341	0	2,770	0	0	0		0	919	988	1,907	0	0	0		429	3,260	988	4,677

Peak AM 60-min totals (8:00 - 9:00):

110	534	0	644	0	0	0	0	0	236	215	451	0	0	0	0	110	770	215	1,095

Peak PM 60-min totals (16:00 - 17:00):

108	629	0	737	0	0	0	0	0	226	258	484	0	0	0	0	108	855	258	1,221

Project: KINGSTON-BEDFORD EIR Project number: 6367.00

Muncipality: BOSTON Date: 9/13/86 Day: SATURDAY Weather: CLEAR By: TU
Intersection: ESSEX/WASHINGTON
Vehicle Type: ALL

	EB on ESSEX				WB on NA				NB on WASHINGTON				SB on NA				TOTALS			
Period	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL
7:00 - 7:15																				
7:15 - 7:30																				
7:30 - 7:45																				
7:45 - 8:00																				
8:00 - 8:15																				
8:15 - 8:30																				
8:30 - 8:45																				
8:45 - 9:00																				
9:00 - 9:15																				
9:15 - 9:30																				
9:30 - 9:45																				
9:45 - 10:00																				
10:00 - 10:15																				
10:15 - 10:30																				
10:30 - 10:45																				
10:45 - 11:00																				
11:00 - 11:15																				
11:15 - 11:30																				
11:30 - 11:45																				
11:45 - 12:00																				
A.M. TOTALS	0	0	0		0	0	0		0	0	0		0	0	0		0	0	0	0
12:00 - 12:15																				
12:15 - 12:30																				
12:30 - 12:45																				
12:45 - 13:00																				
13:00 - 13:15	27	103		130						50	44	94					27	153	44	224
13:15 - 13:30	123	49		172						64	41	105					123	113	41	277
13:30 - 13:45	25	111		136						54	35	89					25	165	35	225
13:45 - 14:00	38	116		154						58	52	110					38	174	52	264
14:00 - 14:15	40	95		135						48	33	81					40	143	33	216
14:15 - 14:30	57	144		201						66	50	116					57	210	50	317
14:30 - 14:45	47	144		191						58	47	105					47	202	47	296
14:45 - 15:00	47	112		159						54	53	107					47	166	53	266
15:00 - 15:15	34	133		167						39	56	95					34	172	56	262
15:15 - 15:30	23	126		149						60	38	98					23	186	38	247
15:30 - 15:45	42	110		152						63	47	110					42	173	47	262
15:45 - 16:00	56	114		170						51	59	110					56	165	59	280
16:00 - 16:15																				
16:15 - 16:30																				
16:30 - 16:45																				
16:45 - 17:00																				
17:00 - 17:15																				
17:15 - 17:30																				
17:30 - 17:45																				
17:45 - 18:00																				
P.M. TOTALS	559	1357	0	1,916	0	0	0		0	665	555	1,220	0	0	0		559	2,022	555	3,136
DAILY TOTALS	559	1357	0		0	0	0		0	665	555		0	0	0		559	2,022	555	0

Peak AM 60-min totals (7:00 - 8:00):

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Peak PM 60-min totals (14:15 - 15:15):

185	533	0	718	0	0	0	0	0	217	206	423	0	0	0	0	185	750	206	1,141

TRAFFIC MOVEMENT SUMMARY TABLE

Project number: 6367.00

Project: KINGSTON-BEDFORD EIR

Muncipality: BOSTON
Intersection: BEACH/HARRISON
Vehicle Type: ALL

Date: 9/11/86 Day: THURSDAY Weather: CLOUDY By: TW

Period	EB on NA				WB on BEACH				NB on NA				SB on HARRISON				TOTALS			
	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL
7:00 - 7:15					34	25		59						18	10	28	34	43	10	87
7:15 - 7:30					40	43		83						27	10	37	40	70	10	120
7:30 - 7:45					61	35		96						21	8	29	61	56	8	125
7:45 - 8:00					55	39		94						16	31	47	55	55	31	141
8:00 - 8:15					58	46		104						29	9	38	58	75	9	142
8:15 - 8:30					52	68		120						35	10	45	52	103	10	165
8:30 - 8:45					45	48		93						20	7	27	45	68	7	120
8:45 - 9:00					51	77		128						17	9	26	51	94	9	154
9:00 - 9:15																				
9:15 - 9:30																				
9:30 - 9:45																				
9:45 - 10:00																				
10:00 - 10:15																				
10:15 - 10:30																				
10:30 - 10:45																				
10:45 - 11:00																				
11:00 - 11:15																				
11:15 - 11:30																				
11:30 - 11:45																				
11:45 - 12:00																				
A.M. TOTALS	0	0	0		396	381	0	777	0	0	0		0	183	94	277	396	564	94	1,054
12:00 - 12:15																				
12:15 - 12:30																				
12:30 - 12:45																				
12:45 - 13:00																				
13:00 - 13:15																				
13:15 - 13:30																				
13:30 - 13:45																				
13:45 - 14:00																				
14:00 - 14:15																				
14:15 - 14:30																				
14:30 - 14:45																				
14:45 - 15:00																				
15:00 - 15:15																				
15:15 - 15:30																				
15:30 - 15:45					54	37		91						60	12	72	54	97	12	163
15:45 - 16:00					35	38		73						50	11	61	35	88	11	134
16:00 - 16:15					54	26		80						65	7	72	54	91	7	152
16:15 - 16:30					59	39		98						71	10	81	59	110	10	179
16:30 - 16:45					41	46		87						54	19	73	41	100	19	160
16:45 - 17:00					48	35		83						74	12	86	48	109	12	169
17:00 - 17:15					38	36		74						84	7	91	38	120	7	165
17:15 - 17:30					69	27		96						74	14	88	69	101	14	184
17:30 - 17:45					50	27		77						65	11	76	50	92	11	153
17:45 - 18:00					51	38		89						73	12	85	51	111	12	174
P.M. TOTALS	0	0	0		499	349	0	848	0	0	0		0	670	115	785	499	1,019	115	1,633
DAILY TOTALS	0	0	0		895	730	0	1,625	0	0	0		0	853	209	1,062	895	1,583	209	2,687

Peak AM 60-min totals (8:00 - 9:00):

0	0	0	0	206	239	0	445	0	0	0	0	0	101	35	136	206	340	35	581

Peak PM 60-min totals (16:30 - 17:30):

0	0	0	0	196	144	0	340	0	0	0	0	0	286	52	338	196	430	52	678

TRAFFIC MOVEMENT SUMMARY TABLE

Project: KINGSTON-BEDFORD EIR　　Project number: 6367.00

Muncipality: BOSTON　　Date: 9/13/86　　Day: SATURDAY　　Weather: CLOUDY　　By: DS
Intersection: BEACH/HARRISON
Vehicle Type: ALL

	EB on MA				WB on BEACH				NB on MA				SB on HARRISON				TOTALS			
Period	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL	LT	TH	RT	ALL
7:00 - 7:15																				
7:15 - 7:30																				
7:30 - 7:45																				
7:45 - 8:00																				
8:00 - 8:15																				
8:15 - 8:30																				
8:30 - 8:45																				
8:45 - 9:00																				
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10:00 - 10:15																				
10:15 - 10:30																				
10:30 - 10:45																				
10:45 - 11:00																				
11:00 - 11:15																				
11:15 - 11:30																				
11:30 - 11:45																				
11:45 - 12:00																				
A.M. TOTALS	0	0	0		0	0	0		0	0	0		0	0	0		0	0	0	0
12:00 - 12:15																				
12:15 - 12:30																				
12:30 - 12:45																				
12:45 - 13:00																				
13:00 - 13:15					41	44		85						61	15	76	41	105	15	161
13:15 - 13:30					42	43		05						58	14	72	42	101	14	157
13:30 - 13:45					53	36		89						47	16	63	53	83	16	152
13:45 - 14:00					57	50		107						45	21	66	57	95	21	173
14:00 - 14:15					49	44		93						54	10	64	49	98	10	157
14:15 - 14:30					59	53		112						65	16	81	59	118	16	193
14:30 - 14:45					46	44		90						57	19	76	46	101	19	166
14:45 - 15:00					57	34		91						61	23	84	57	95	23	175
15:00 - 15:15					62	44		106						77	11	88	62	121	11	194
15:15 - 15:30					40	27		67						37	18	55	40	64	18	122
15:30 - 15:45					62	37		99						73	27	100	62	110	27	199
15:45 - 16:00					65	50		115						68	16	84	65	118	16	199
16:00 - 16:15																				
16:15 - 16:30																				
16:30 - 16:45																				
16:45 - 17:00																				
17:00 - 17:15																				
17:15 - 17:30																				
17:30 - 17:45																				
17:45 - 18:00																				
P.M. TOTALS	0	0	0		633	506	0	1,139	0	0	0		0	703	206	909	633	1,209	206	2,048
DAILY TOTALS	0	0	0		633	506	0		0	0	0		0	703	206		633	1,209	206	0
Peak AM 60-min totals (7:00 - 8:00):																				
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak PM 60-min totals (14:15 - 15:15):																				
	0	0	0	0	224	175	0	399	0	0	0	0	0	260	69	329	224	435	69	728

INT. NO. # 1270

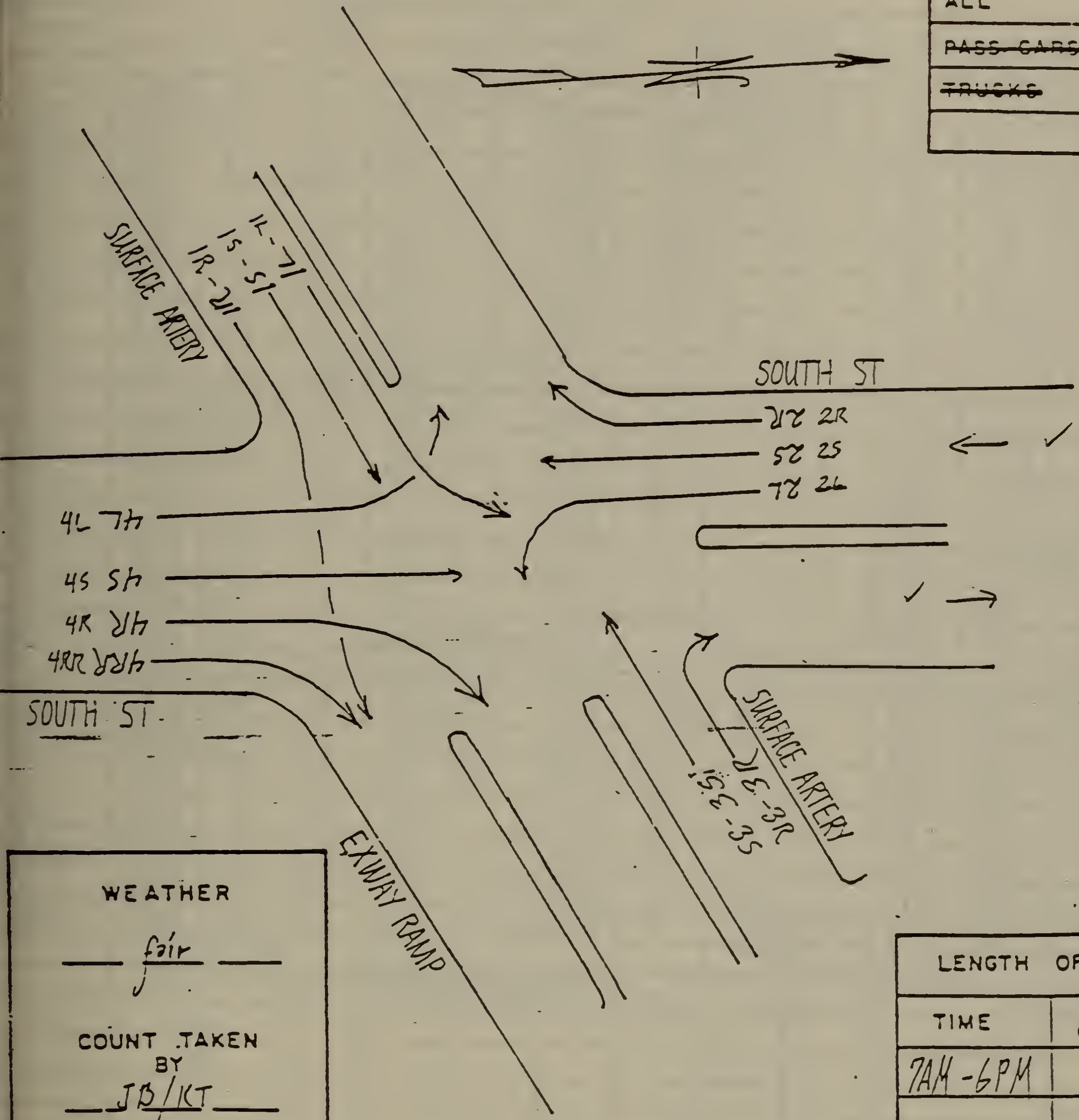
City Proper

DATE 4/15 + 5/12/88 DAY OF WEEK Thurs

INTERSECTION TURNING MOVEMENT COUNT

#88207

VEHICLES COUNTED	
ALL	X
~~PASS. CARS~~	
~~TRUCKS~~	~~(X)~~



WEATHER

fair

COUNT TAKEN BY

JB/KT

LENGTH OF COUNT	
TIME	NUMBER OF HOURS
7AM-6PM	11

STREET		ENTERING VOLUME	FLOW PERCENT
1) SURFACE ARTERY	E.B. (N.B.)	14484	45.9
2) SOUTH ST	S.B.	1365	4.3
3) SURFACE ARTERY	W.B. (S.B.)	6859	21.8
4) SOUTH ST	N.B.	8828	28.0
TOTALS		31536	100.0

COMMENTS

during the 11hrs 5 Taxis made what might have been move 3L (Surface S.B. to Ramp)

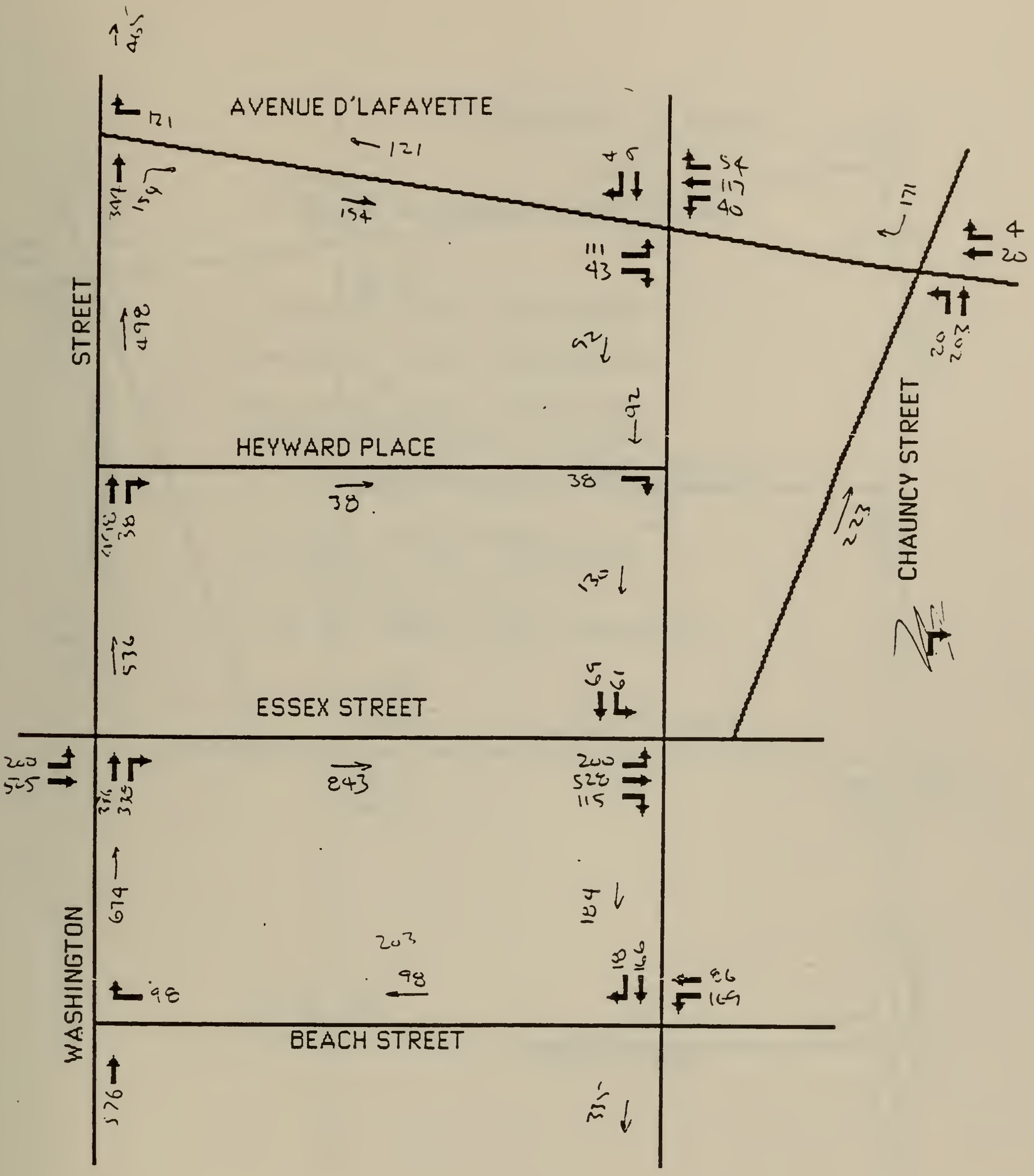
IC MOVEMENT SUMMARY TABLE

South St & Surface Artery — CITY OR TOWN City Proper

TE 5/12 4/15-'88 DAY OF WEEK Thurs AM / Thurs PM WEATHER AM Sun / PM Sun RECORDER JB/KT

#88207

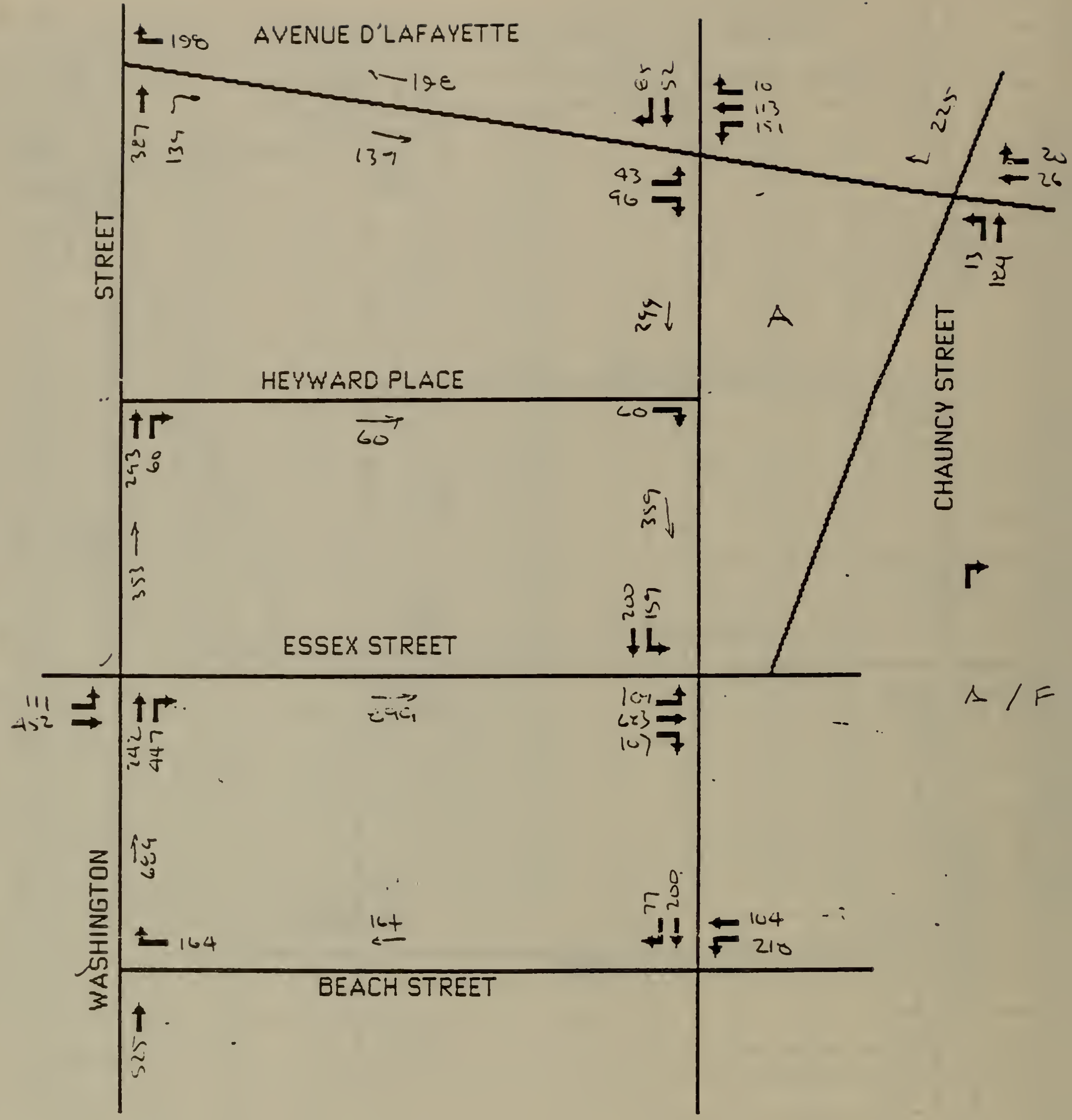
TIME STARTS __ M	Surface Artery			South St			Surface Artery		South St				TOTAL HALF HOUR TALLY
	✓ Northbound ✓			✓	✓	✓	Westbound ✓		✓				
	1L	1S	1R	2L	2S	2R	3S	3R	4L	4S	4R	4RR	
:00-7:30	38	101	186	0	0	53	238	0	14	165	28	79	902
:30-8:00	59	216	210	0	0	78	245	0	37	282	33	73	1233
:00-8:30	63	194	295	0	0	62	298	0	51	271	37	71	1342
:30-9:00	58	195	354	0	0	87	281	0	50	233	42	77	1377
:00-9:30	64	166	306	0	1	55	226	0	48	166	42	104	1178
:30-10:00	45	153	203	0	2	48	229	0	34	131	28	74	946
0:00-10:30	57	152	257	4	1	74	272	0	32	106	31	82	1068
0:30-11:00	34	197	461	0	0	81	338	3	42	71	22	67	1316
1:00-11:30	38	119	312	0	0	26	150	0	42	69	20	90	866
1:30-12:00	43	300	435	2	3	34	429	0	84	127	57	109	162
2:00-12:30	36	212	427	0	0	63	322	1	31	105	30	161	1388
2:30-1:00	41	288	381	2	0	54	315	0	33	99	46	172	1431
1:00-1:30	60	152	401	1	0	66	329	-1	44	44	33	250	1381
1:30-2:00	61	148	397	0	0	57	352	-2	56	51	28	201	135
2:00-2:30	40	181	489	0	0	72	334	0	41	47	32	274	151
2:30-3:00	41	191	499	0	0	62	359	1	42	53	34	301	158
3:00-3:30	44	201	545	1	0	72	502	0	44	57	43	275	178
3:30-4:00	37	165	604	1	0	62	342	2	32	70	48	329	169
:00-4:30	46	159	578	0	0	45	276	1	46	73	16	381	162
:30-5:00	39	207	705	0	0	75	285	0	63	105	30	429	193
:00-5:30	30	272	631	0	0	64	381	0	56	77	18	652	218
:30-6:00	38	292	535	0	0	57	346	0	35	31	38	451	182
:00-6:30													
:30-7:00													
:00-7:30													
:30-8:00													
:00-8:30													
:30-9:00													
:00-9:30													
:30-10:00													
0:00-10:30													
0:30-11.00													
TOTAL	1012	4261	9211	11	7	1347	6848	11	957	2433	736	4702	GRAND TOTAL
TOTAL OF L S & R	14484			1365			6859		8828				31536



600 Washington Street - (1983)
(non published)

Balanced AM
Peak Flows

A/



600 WASHINGTON STREET - (1988)

(NON-PUBLISHED)

BALANCED PM
PEAK FLOWS

APPENDIX B-3

LEVEL OF SERVICE CALCULATIONS

- EXISTING (1988) CONDITIONS
- NO BUILD (1993) CONDITIONS
- NO BUILD (1993) CONDITIONS - WITH IMPROVEMENTS BY OTHERS
- 400 FT. TOWER (1993) CONDITIONS
- TWO-WAY ESSEX STREET - NO BUILD (1993) CONDITIONS
- TWO-WAY ESSEX STREET - 400 FT. TOWER (1933) CONDITIONS

LEVEL OF SERVICE CALCULATIONS:

EXISTING (1988) CONDITIONS

(AM, PM and SAT peak hours)

- Summer/High/South
- Summer/Lincoln/Bedford
- Summer/Otis/Kingston
- Bedford/Columbia
- Bedford/Kingston
- Bedford/Chauncy/LP Garage
- Surface Artery/Essex/Lincoln
- Essex/Kingston/Ave. DeLafayette
- Essex/Harrison/Chauncy
- Essex/Washington
- Harrison/Beach

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
SUMMER/HIGH/SOUTH STREETS
EXISTING CONDITIONS: AM PEAK HOUR
date:11-28-1988             time:12:29:12
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=KBI1AM     GEOMETRICS=KBINT1     SIGNAL=KBINT1
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT    TH    RT    WALK
EB   72   37   86     0  1  1     0.0 10.0 10.0    10
WB    0  225  125     0  2  1     0.0 12.0 11.0    33
NB  109  525    0     1  1  0    10.0 11.0  0.0    27
SB   13   49   82     0  1  1     0.0 12.0 12.0    38

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   Y     0    0   .920  200   Y    11.3     3
WB  0.0%  2.0%   N     0   10   .920  400   Y    11.3     3
NB  0.0%  2.0%   N     0   30   .920  750   y    12.5     3
SB  0.0%  2.0%         0    0   .920 1100   y    12.5     3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *     *  *  *              *           *  20.8   4    A
 2           *           *  *  *  *     *  *  *     31.2   4    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB    72   37   86  .920    78   40   93
WB     0  225  125  .920     0  245  136
NB   109  525    0  .920   118  571    0
SB    13   49   82  .920    14   53   89

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU     v  Plt  Prt
EB  LT-TH      118 1 1.00  118 0.66 0.00
EB  RT          93 1 1.00   93 0.00 1.00
WB  TH         245 2 1.05  257 0.00 0.00
WB  RT         136 1 1.00  136 0.00 1.00
NB  LT         118 1 1.00  118 1.00 0.00
NB  TH         571 1 1.00  571 0.00 0.00
SB  LT-TH       67 1 1.00   67 0.21 0.00
SB  RT          89 1 1.00   89 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES      OPPOSING
                 LT   TH   RT        LT   TH    RT         LT  TH  RT     VOLUME
EASTBOUND         0  245  136       100  100     0          0   2   1      245
NORTHBOUND       14   53   89       100  100     0          0   1   1       53
SOUTHBOUND      118  571    0       100  100   100          1   1   0      571

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt     s
EB  LT-TH     1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.829 1241
EB  RT        1800  1 0.933 0.990 1.000 1.000 1.000 0.900 0.493 1.000  738
WB  TH        1800  2 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3208
WB  RT        1800  1 0.967 0.990 1.000 1.000 0.958 0.900 0.326 1.000  485
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NB  LT          1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.850 1272
NB  TH          1800  1 0.967 0.990 1.000 1.000 0.875 0.900 1.000 1.000 1357
SB  LT-TH       1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.728 1168
SB  RT          1800  1 1.000 0.990 1.000 1.000 1.000 0.900 0.755 1.000 1211

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N    Va    Vm   Vlt  Plt No    Vo Plto
EB  60  21  1   118   134    78 0.66  2   245 0.00
NB  60  31  1   118   571   118 1.00  1    53 0.21
SB  60  31  1    67   142    14 0.21  1   571 0.00
CALCULATIONS
DIR Sop    Yo     Gu     Fs     Pl      Gq     Pt      Gf        El     Fm    Flt
EB 3600 0.068 17.939 0.722 0.661   2.857 0.339   0.808     1.558 0.829 0.829
NB 1445 0.037 30.102 0.842 1.000   1.102 0.000   0.000     1.337 0.850 0.850
SB 1800 0.317 17.837 0.518 0.210 13.367 0.790   5.974     2.170 0.728 0.728

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v    s  v/s  g/C     c  v/c  CRITICAL
EB  LT-TH      118 1241 0.10 0.35  430 0.28
EB  RT          93  738 0.13 0.35  256 0.37
WB  TH         257 3208 0.08 0.35 1112 0.23
WB  RT         136  485 0.28 0.35  168 0.81      *
NB  LT         118 1272 0.09 0.52  662 0.18
NB  TH         571 1357 0.42 0.52  706 0.81      *
SB  LT-TH       67 1168 0.06 0.52  607 0.11
SB  RT          89 1211 0.07 0.52  630 0.14

CYCLE= 60.0  LOST= 8.0  SUM V/S CRIT= 0.70 TOTAL V/C= 0.81

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C      d1     c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH     0.28 0.35  60.0  10.76   430    0.09 0.85    9.23  B   1.3
EB  RT        0.37 0.35  60.0  11.15   256    0.41 0.85    9.82  B   1.0
WB  TH        0.23 0.35  60.0  10.58  1112    0.02 0.85    9.01  B   2.7
WB  RT        0.81 0.35  60.0  13.53   168   16.50 0.85   25.52  D   1.7
NB  LT        0.18 0.52  60.0   5.79   662    0.01 0.85    4.93  A   0.9
NB  TH        0.81 0.52  60.0   9.06   706    4.88 0.85   11.85  B   4.6
SB  LT-TH     0.11 0.52  60.0   5.57   607    0.00 0.85    4.74  A   0.5
SB  RT        0.14 0.52  60.0   5.67   630    0.01 0.85    4.82  A   0.7

DIR Delay LOS
EB   9.49  B
WB  14.72  B
NB  10.66  B
SB   4.79  A
INTERSECTION DELAY = 10.96 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  30.5 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
SUMMER/HIGH/SOUTH STREETS
EXISTING CONDITIONS: PM PEAK HOUR
date:11-28-1988             time:12:33:10
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=KBI1PM     GEOMETRICS=KBINT1      SIGNAL=KBINT1
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB  135   70   75     0  2  0     0.0 10.0  0.0    10
WB    0  240   76     0  2  1     0.0 12.0 11.0    33
NB   40  210    0     1  1  0    10.0 11.0  0.0    27
SB   15   70  102     0  1  1     0.0 12.0 12.0    38

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK            PEDESTRIANS       ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   Y     2   30  .930  150   Y    11.3    3
WB  0.0%  2.0%   N     0   10  .930  100   Y    11.3    3
NB  0.0%  2.0%   N     0   30  .930 1000   y    12.5    3
SB  0.0%  2.0%         0    0  .930  850   y    12.5    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *     *  *  *              *           *  26.0    4    A
 2           *           *  *  *  *     *  *  *     26.0    4    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB   135   70   75  .930   145   75   81
WB     0  240   76  .930     0  258   82
NB    40  210    0  .930    43  226    0
SB    15   70  102  .930    16   75  110

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
EB  LT-TH-RT   301 2 1.05  316 0.48 0.27
WB  TH         258 2 1.05  271 0.00 0.00
WB  RT          82 1 1.00   82 0.00 1.00
NB  LT          43 1 1.00   43 1.00 0.00
NB  TH         226 1 1.00  226 0.00 0.00
SB  LT-TH       91 1 1.00   91 0.18 0.00
SB  RT         110 1 1.00  110 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT    VOLUME
EASTBOUND         0  258   82       100  100    0        0   2   1     258
NORTHBOUND       16   75  110       100  100    0        0   1   1      75
SOUTHBOUND       43  226    0       100  100  100        1   1   0     226

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid    Fhv    Fgr Fpark  Fbus Farea   Frt   Flt     s
EB  LT-TH-RT  1800  2 0.933 0.990 1.000 0.945 0.938 0.900 0.832 0.862 1903
WB  TH        1800  2 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3208
WB  RT        1800  1 0.967 0.990 1.000 1.000 0.958 0.900 0.445 1.000  662
NB  LT        1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.844 1263
NB  TH        1800  1 0.967 0.990 1.000 1.000 0.875 0.900 1.000 1.000 1357
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SB  LT-TH      1800   1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.968 1553
SB  RT         1800   1 1.000 0.990 1.000 1.000 1.000 0.900 0.779 1.000 1249

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm   Vlt  Plt No   Vo Plto
EB  60  26  2  301  301  145 0.48  2  258 0.00
NB  60  26  1   43  226   43 1.00  1   75 0.18
SB  60  26  1   91  185   16 0.18  1  226 0.00
CALCULATIONS
DIR Sop    Yo     Gu     Fs     Pl     Gq    Pt     Gf         El    Fm   Flt
EB 3600 0.072 23.351 0.714 1.000  2.627 0.000  0.000      1.576 0.724 0.862
NB 1645 0.046 24.393 0.828 1.000  1.629 0.000  0.000      1.359 0.844 0.844
SB 1800 0.125 21.148 0.734 0.176  4.874 0.824  3.518      1.533 0.968 0.968

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH-RT  316 1903 0.17 0.43  824 0.38     *
WB  TH        271 3208 0.08 0.43 1389 0.20
WB  RT         82  662 0.12 0.43  286 0.29
NB  LT         43 1263 0.03 0.43  548 0.08
NB  TH        226 1357 0.17 0.43  588 0.38     *
SB  LT-TH      91 1553 0.06 0.43  674 0.14
SB  RT        110 1249 0.09 0.43  542 0.20

CYCLE= 60.0  LOST= 8.0  SUM V/S CRIT= 0.33 TOTAL V/C= 0.38

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.38 0.43  60.0  8.79  824    0.15 0.85    7.60  B   2.8
WB  TH       0.20 0.43  60.0  8.01 1389    0.01 0.85    6.81  B   2.4
WB  RT       0.29 0.43  60.0  8.36  286    0.16 0.85    7.24  B   0.8
NB  LT       0.08 0.43  60.0  7.57  548    0.00 0.85    6.44  B   0.4
NB  TH       0.38 0.43  60.0  8.77  588    0.21 0.85    7.64  B   2.1
SB  LT-TH    0.14 0.43  60.0  7.77  674    0.01 0.85    6.61  B   0.9
SB  RT       0.20 0.43  60.0  8.02  542    0.03 0.85    6.84  B   1.0

DIR Delay LOS
EB   7.60  B
WB   6.91  B
NB   7.45  B
SB   6.73  B
INTERSECTION DELAY =  7.20 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  12.3 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
SUMMER/HIGH/SOUTH STREETS
EXISTING CONDITIONS: SAT PEAK HOUR
date:11-28-1988             time:12:35:57
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=KBI1SAT    GEOMETRICS=KBINT1     SIGNAL=KBINT1
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB   21   38   50     0  1  1     0.0 10.0 10.0    10
WB    0  191   52     0  2  1     0.0 12.0 11.0    33
NB   28   45    0     1  1  0    10.0 11.0  0.0    27
SB    9   47  138     0  1  1     0.0 12.0 12.0    38

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   Y      0    0   .910  100   Y    11.3     3
WB  0.0%  2.0%   N      0   10   .910  100   Y    11.3     3
NB  0.0%  2.0%   N      0   30   .910  600   y    12.5     3
SB  0.0%  2.0%          0    0   .910  600   y    12.5     3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *     *  *  *              *           *  19.2   4    A
 2           *           *  *  *  *     *  *  *     32.8   4    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV    PHF LTFR THFR RTFR
EB    21   38   50  .910    23   42   55
WB     0  191   52  .910     0  210   57
NB    28   45    0  .910    31   49    0
SB     9   47  138  .910    10   52  152

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v   Plt Prt
EB  LT-TH       65 1 1.00   65 0.36 0.00
EB  RT          55 1 1.00   55 0.00 1.00
WB  TH         210 2 1.05  220 0.00 0.00
WB  RT          57 1 1.00   57 0.00 1.00
NB  LT          31 1 1.00   31 1.00 0.00
NB  TH          49 1 1.00   49 0.00 0.00
SB  LT-TH       62 1 1.00   62 0.16 0.00
SB  RT         152 1 1.00  152 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT    VOLUME
EASTBOUND         0  210   57       100  100    0        0   2   1      210
NORTHBOUND       10   52  152       100  100    0        0   1   1       52
SOUTHBOUND       31   49    0       100  100  100        1   1   0       49

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  LT-TH     1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.956 1432
EB  RT        1800  1 0.933 0.990 1.000 1.000 1.000 0.900 0.564 1.000  845
WB  TH        1800  2 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3208
WB  RT        1800  1 0.967 0.990 1.000 1.000 0.958 0.900 0.564 1.000  838
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NB  LT         1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.852 1275
NB  TH         1800  1 0.967 0.990 1.000 1.000 0.875 0.900 1.000 1.000 1357
SB  LT-TH      1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604
SB  RT         1800  1 1.000 0.990 1.000 1.000 1.000 0.900 0.802 1.000 1287

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
EB  60  19  1   65   97   23 0.36  2  210 0.00
NB  60  33  1   31   49   31 1.00  1   52 0.16
SB  60  33  1   62  203   10 0.16  1   49 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
EB 3600 0.058 16.623 0.744 0.356  2.529 0.644  1.544    1.512 0.956 0.956
NB 1709 0.030 32.002 0.843 1.000  0.846 0.000  0.000    1.335 0.852 0.852
SB 1800 0.027 32.081 0.844 0.161  0.767 0.839  0.679    1.333 1.000 1.000

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH      65 1432 0.05 0.32  457 0.14
EB  RT         55  845 0.07 0.32  270 0.20
WB  TH        220 3208 0.07 0.32 1024 0.22     *
WB  RT         57  838 0.07 0.32  268 0.21
NB  LT         31 1275 0.02 0.55  698 0.04
NB  TH         49 1357 0.04 0.55  743 0.07
SB  LT-TH      62 1604 0.04 0.55  878 0.07
SB  RT        152 1287 0.12 0.55  705 0.22     *

CYCLE= 60.0  LOST= 8.0  SUM V/S CRIT= 0.19 TOTAL V/C= 0.22

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1    c     d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH    0.14 0.32  60.0  11.07  457   0.01 0.85    9.42  B   0.7
EB  RT       0.20 0.32  60.0  11.30  270   0.05 0.85    9.65  B   0.6
WB  TH       0.22 0.32  60.0  11.35 1024   0.02 0.85    9.66  B   2.4
WB  RT       0.21 0.32  60.0  11.34  268   0.06 0.85    9.69  B   0.6
NB  LT       0.04 0.55  60.0   4.78  698   0.00 0.85    4.07  A   0.2
NB  TH       0.07 0.55  60.0   4.85  743   0.00 0.85    4.12  A   0.4
SB  LT-TH    0.07 0.55  60.0   4.86  878   0.00 0.85    4.13  A   0.5
SB  RT       0.22 0.55  60.0   5.29  705   0.02 0.85    4.52  A   1.1

DIR Delay LOS
EB   9.53  B
WB   9.67  B
NB   4.10  A
SB   4.41  A
INTERSECTION DELAY =  7.37 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  10.0 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
SUMMER/LINCOLN/BEDFORD
EXISTING CONDITIONS: AM PEAK HOUR
date:12-16-1988             time:10:10:16
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=KBI2AM     GEOMETRICS=KBINT2      SIGNAL=KBINT2
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH     RT    LT TH RT      LT    TH    RT    WALK
EB    0   90    3     0  1  1     0.0 10.0  9.0    36
WB  165  255    0     1  1  0    13.0 13.0  0.0    33
NB  268  327  101     1  1  1    10.0 10.0 10.0    27
SB    0    0    0     0  0  0     0.0  0.0  0.0     0

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N      0    0  .910  450   N    14.0    3
WB  0.0%  2.0%   N      0    0  .910 1000   N    14.0    3
NB  0.0%  2.0%   N      0    0  .910  850   N    11.8    3
SB  0.0%  0.0%          0    0  .000    0        11.8    0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1            *           *  *  *  *                 30.8   2    A
 2     *  *        *                 *           *   8.5   2    A
 3              *  *                             *  14.8   2    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0   90    3  .910     0   99    3
WB   165  255    0  .910   181  280    0
NB   268  327  101  .910   295  359  111
SB     0    0    0  .000     0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N    LU     v  Plt  Prt
EB  TH           99 1 1.00    99 0.00 0.00
EB  RT            3 1 1.00     3 0.00 1.00
WB  LT          181 1 1.00   181 1.00 0.00
WB  TH          280 1 1.00   280 0.00 0.00
NB  LT          295 1 1.00   295 1.00 0.00
NB  TH          359 1 1.00   359 0.00 0.00
NB  RT          111 1 1.00   111 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT        LT  TH  RT     VOLUME
WESTBOUND         0   99    3         0    0    0        0   1   1       0
NORTHBOUND        0    0    0         0    0    0        0   0   0       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP   IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  TH          1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
EB  RT          1800  1 0.900 0.990 1.000 1.000 1.000 0.900 0.445 1.000  643
WB  LT          1800  1 1.033 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1575
WB  TH          1800  1 1.033 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1657
NB  LT          1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1422
NB  TH        1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
NB  RT        1800  1 0.933 0.990 1.000 1.000 1.000 0.900 0.374 1.000  560

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  TH         99 1497 0.07 0.14  211 0.47      *
EB  RT          3  643 0.01 0.14   91 0.04
WB  LT        181 1575 0.12 0.25  387 0.47      *
WB  TH        280 1657 0.17 0.42  697 0.40
NB  LT        295 1422 0.21 0.51  729 0.40
NB  TH        359 1497 0.24 0.51  768 0.47      *
NB  RT        111  560 0.20 0.51  287 0.39

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.42 TOTAL V/C= 0.47

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP v/c  g/C    C     d1    c      d2   PF  Delay LOS Avg Q  95% Q
EB  TH       0.47 0.14  60.0  18.01  211      1.23 0.85   16.35  C   1.4
EB  RT       0.04 0.14  60.0  16.90   91      0.00 0.85   14.37  B   0.0
WB  LT       0.47 0.25  60.0  14.65  387      0.68 1.00   15.33  C   2.3
WB  TH       0.40 0.42  60.0   9.21  697      0.21 0.85    8.01  B   2.7
NB  LT       0.40 0.51  60.0   6.82  729      0.21 1.00    7.03  B   2.4
NB  TH       0.47 0.51  60.0   7.12  768      0.34 0.85    6.35  B   2.9
NB  RT       0.39 0.51  60.0   6.75  287      0.45 0.85    6.12  B   0.9

DIR Delay LOS
EB  16.28  C
WB  10.89  B
NB   6.58  B
INTERSECTION DELAY =  8.82 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  10.8 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
SUMMER/LINCOLN/BEDFORD
EXISTING CONDITIONS: PM PEAK HOUR
date:11-23-1988             time:15:24:57
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=KBI2PM     GEOMETRICS=KBINT2     SIGNAL=KBINT2
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB    0  150    5     0  1  1     0.0 10.0  9.0    36
WB  195  185    0     1  1  0    13.0 13.0  0.0    33
NB   54  224  132     1  1  1    10.0 10.0 10.0    27
SB    0    0    0     0  0  0     0.0  0.0  0.0     0

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0    0   .920  450   N    14.0    3
WB  0.0%  2.0%   N     0   21   .920 1000   N    14.0    3
NB  0.0%  2.0%   N     0    0   .920  850   N    11.8    3
SB  0.0%  0.0%         0    0   .000    0        11.8    0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1           *           *  *  *  *                   27.7   2    A
 2     *  *        *                 *           *  11.8   2    A
 3              *  *                             *  14.5   2    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0  150    5  .920     0  163    5
WB   195  185    0  .920   212  201    0
NB    54  224  132  .920    59  243  143
SB     0    0    0  .000     0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
EB  TH         163 1 1.00  163 0.00 0.00
EB  RT           5 1 1.00    5 0.00 1.00
WB  LT         212 1 1.00  212 1.00 0.00
WB  TH         201 1 1.00  201 0.00 0.00
NB  LT          59 1 1.00   59 1.00 0.00
NB  TH         243 1 1.00  243 0.00 0.00
NB  RT         143 1 1.00  143 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT  TH    RT        LT   TH   RT       LT  TH  RT    VOLUME
WESTBOUND         0  163    5         0    0    0        0   1   1       0
NORTHBOUND        0    0    0         0    0    0        0   0   0       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
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EB  TH          1800   1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
EB  RT          1800   1 0.900 0.990 1.000 1.000 1.000 0.900 0.445 1.000  643
WB  LT          1800   1 1.033 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1575
WB  TH          1800   1 1.033 0.990 1.000 1.000 0.913 0.900 1.000 1.000 1512
NB  LT          1800   1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1422
NB  TH          1800   1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
NB  RT          1800   1 0.933 0.990 1.000 1.000 1.000 0.900 0.374 1.000  560

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v     s  v/s  g/C     c  v/c  CRITICAL
EB  TH         163 1497 0.11 0.20   294 0.56     *
EB  RT           5  643 0.01 0.20   126 0.04
WB  LT         212 1575 0.13 0.24   382 0.56     *
WB  TH         201 1512 0.13 0.47   713 0.28
NB  LT          59 1422 0.04 0.46   656 0.09
NB  TH         243 1497 0.16 0.46   691 0.35
NB  RT         143  560 0.26 0.46   258 0.56     *

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.50 TOTAL V/C= 0.56

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C      d1     c       d2   PF    Delay LOS Avg Q  95% Q
EB  TH        0.56 0.20  60.0  16.54   294     1.75 0.85   15.55  C    2.2
EB  RT        0.04 0.20  60.0  14.86   126     0.00 0.85   12.63  B    0.1
WB  LT        0.56 0.24  60.0  15.12   382     1.36 1.00   16.48  C    2.7
WB  TH        0.28 0.47  60.0   7.34   713     0.06 0.85    6.29  B    1.8
NB  LT        0.09 0.46  60.0   6.89   656     0.00 1.00    6.90  B    0.5
NB  TH        0.35 0.46  60.0   7.89   691     0.13 0.85    6.82  B    2.2
NB  RT        0.56 0.46  60.0   8.89   258     1.98 0.85    9.24  B    1.3

DIR Delay LOS
EB  15.45  C
WB  11.52  B
NB   7.61  B
INTERSECTION DELAY = 10.47 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  12.7 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
SUMMER/LINCOLN/BEDFORD
EXISTING CONDTIONS: SAT PEAK HOUR
date:11-23-1988             time:15:31:57
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=KBI2SAT    GEOMETRICS=KBINT2     SIGNAL=KBINT2
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH    RT     WALK
EB     0   80    5     0  1  1     0.0 10.0  9.0     36
WB    96  261    0     1  1  0    13.0 13.0  0.0     33
NB   120  163   31     1  1  1    10.0 10.0 10.0     27
SB     0    0    0     0  0  0     0.0  0.0  0.0      0

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0    0  .950   50   N    14.0    3
WB  0.0%  2.0%   N     0   21  .950  350   N    14.0    3
NB  0.0%  2.0%   N     0    0  .950  400   N    11.8    3
SB  0.0%  0.0%         0    0  .000    0        11.8    0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1           *           *  *  *  *                  21.7   2    A
 2     *  *        *                 *           *  15.1   2    A
 3              *  *                             *  17.2   2    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0   80    5  .950     0   84    5
WB    96  261    0  .950   101  275    0
NB   120  163   31  .950   126  172   33
SB     0    0    0  .000     0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N    LU     v  Plt  Prt
EB  TH          84 1 1.00   84 0.00 0.00
EB  RT           5 1 1.00    5 0.00 1.00
WB  LT         101 1 1.00  101 1.00 0.00
WB  TH         275 1 1.00  275 0.00 0.00
NB  LT         126 1 1.00  126 1.00 0.00
NB  TH         172 1 1.00  172 0.00 0.00
NB  RT          33 1 1.00   33 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT        LT  TH  RT     VOLUME
WESTBOUND         0   84    5         0    0    0         0   1   1        0
NORTHBOUND        0    0    0         0    0    0         0   0   0        0

SATURATION FLOW ADJUSTMENT WORKSHEET
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DIR LN GROUP   IDEAL N  Fwid    Fhv    Fgr Fpark  Fbus Farea    Frt    Flt     s
EB  TH          1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
EB  RT          1800  1 0.900 0.990 1.000 1.000 1.000 0.900 0.660 1.000  952
WB  LT          1800  1 1.033 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1575
WB  TH          1800  1 1.033 0.990 1.000 1.000 0.913 0.900 1.000 1.000 1512
NB  LT          1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1422
NB  TH          1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
NB  RT          1800  1 0.933 0.990 1.000 1.000 1.000 0.900 0.683 1.000 1023

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v     s  v/s  g/C     c  v/c  CRITICAL
EB  TH          84  1497 0.06 0.25   377 0.22
EB  RT           5   952 0.01 0.25   240 0.02
WB  LT         101  1575 0.06 0.29   452 0.22
WB  TH         275  1512 0.18 0.57   866 0.32      *
NB  LT         126  1422 0.09 0.36   513 0.25
NB  TH         172  1497 0.11 0.36   541 0.32      *
NB  RT          33  1023 0.03 0.36   369 0.09

CYCLE= 60.0  LOST= 4.0  SUM V/S CRIT= 0.30 TOTAL V/C= 0.32

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1     c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH       0.22 0.25  60.0  13.53  377    0.05 0.85   11.54  B    1.1
EB  RT       0.02 0.25  60.0  12.84  240    0.00 0.85   10.91  B    0.1
WB  LT       0.22 0.29  60.0  12.38  452    0.04 1.00   12.42  B    1.2
WB  TH       0.32 0.57  60.0   5.10  866    0.07 0.85    4.40  A    2.0
NB  LT       0.25 0.36  60.0  10.22  513    0.05 1.00   10.27  B    1.3
NB  TH       0.32 0.36  60.0  10.51  541    0.12 0.85    9.04  B    1.8
NB  RT       0.09 0.36  60.0   9.61  369    0.00 0.85    8.17  B    0.3

DIR Delay LOS
EB  11.51  B
WB   6.55  B
NB   9.42  B
INTERSECTION DELAY =  8.30 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE   5.8 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
OTIS/KINGSTON/SUMMER STREETS
EXISTING CONDITIONS: AM PEAK HOUR
date:12-16-1988             time:10:05:47
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=KBI3AM     GEOMETRICS=KBINT3      SIGNAL=KBINT3
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES       # OF LANES      LANE WIDTH     CROSS
DIR  LT   TH    RT     LT TH RT       LT    TH    RT     WALK
EB    0   39    48     0  1  1     0.0 12.0 12.0     25
WB   80    0     0     1  0  0    12.0  0.0  0.0     32
NB    0    0     0     0  0  0     0.0  0.0  0.0      0
SB   52  156     0     1  1  0    12.0 12.0  0.0     25

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                PEDESTRIANS        ARR
DIR GRADE %HV    Y/N MOVES BUSES   PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%    Y     10     0   .880  400    N    11.0    3
WB  0.0%  2.0%    N      0     0   .880  400    N    11.0    3
NB  0.0%  0.0%           0     0   .880    0          9.3    3
SB  0.0%  2.0%    N      0     0   .880  400    N     9.3    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1     *  *     *                    *           *  18.7   4    A
 2           *           *              *  *        33.3   4    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0   39   48 .880     0   44   55
WB    80    0    0 .880    91    0    0
NB     0    0    0 .880     0    0    0
SB    52  156    0 .880    59  177    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N    LU     v  Plt  Prt
EB  TH           44 1 1.00    44 0.00 0.00
EB  RT           55 1 1.00    55 0.00 1.00
WB  LT           91 1 1.00    91 1.00 0.00
SB  LT           59 1 1.00    59 1.00 0.00
SB  TH          177 1 1.00   177 0.00 0.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                 OPPOSING APPROACH
BEING OPPOSED       VOLUMES       % OPPOSING LEFT TURN     # LANES     OPPOSING
                  LT    TH    RT        LT    TH    RT       LT  TH  RT     VOLUME
WESTBOUND          0    44    55       100   100     0        0   1   1        44
SOUTHBOUND         0     0     0         0     0     0        0   0   0         0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  TH         1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604
EB  RT         1800  1 1.000 0.990 1.000 0.849 1.000 0.900 0.850 1.000 1157
WB  LT         1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.925 1484
SB  LT         1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
SB  TH         1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
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DIR  C   G  N   Va    Vm  Vlt  Plt No   Vo Plto
WB  60  19  1   91    0   91 1.00  1    44 0.00
CALCULATIONS
DIR Sop    Yo     Gu     Fs     Pl      Gq     Pt     Gf        El     Fm    Flt
WB 1800 0.025 17.670 0.847 1.000  1.042 0.000  0.000    1.328 0.925 0.925

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v     s  v/s  g/C     c  v/c  CRITICAL
EB  TH          44 1604 0.03 0.31   500 0.09
EB  RT          55 1157 0.05 0.31   361 0.15
WB  LT          91 1484 0.06 0.31   463 0.20      *
SB  LT          59 1524 0.04 0.55   845 0.07
SB  TH         177 1604 0.11 0.55   890 0.20      *

CYCLE= 60.0  LOST= 8.0  SUM V/S CRIT= 0.17 TOTAL V/C= 0.20

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1     c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH       0.09 0.31  60.0  11.10  500    0.00 0.85    9.44  B   0.5
EB  RT       0.15 0.31  60.0  11.33  361    0.02 0.85    9.64  B   0.6
WB  LT       0.20 0.31  60.0  11.50  463    0.03 0.85    9.80  B   1.0
SB  LT       0.07 0.55  60.0   4.70  845    0.00 1.00    4.70  A   0.4
SB  TH       0.20 0.55  60.0   5.08  890    0.02 0.85    4.33  A   1.3

DIR Delay LOS
EB   9.55  B
WB   9.80  B
SB   4.42  A
INTERSECTION DELAY =  6.76 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE   9.8 SECONDS
for chosen cycle length  60.0
suggested timing phase 1 is  18.5 secs green,   4.0 secs yellow + red clear
suggested timing phase 2 is  33.5 secs green,   4.0 secs yellow + red clear
```

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
OTIS/KINGSTON/SUMMER STREETS
EXISTING CONDITIONS: PM PEAK HOUR
date:11-28-1988              time:12:49:38
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=KBI3PM     GEOMETRICS=KBINT3      SIGNAL=KBINT3
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES         # OF LANES      LANE WIDTH      CROSS
DIR  LT    TH    RT     LT  TH  RT      LT    TH    RT     WALK
EB    0    71    78      0   1   1      0.0  12.0  12.0     25
WB   85     0     0      1   0   0     12.0   0.0   0.0     32
NB    0     0     0      0   0   0      0.0   0.0   0.0      0
SB   82   293     0      1   1   0     12.0  12.0   0.0     25

TRAFFIC & ROADWAY CONDITIONS
                  ADJ PARK                 PEDESTRIANS          ARR
DIR GRADE %HV    Y/N.MOVES BUSES   PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%    Y    10     0   .980  400   N     11.0     3
WB  0.0%  2.0%    N     0     0   .980  400   N     11.0     3
NB  0.0%  0.0%          0     0   .980    0          9.3     3
SB  0.0%  2.0%    N     0     0   .980  400   N      9.3     3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1     *  *     *                    *           * 14.0   4    A
 2              *           *              *  *    38.0   4    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR   LTV   THV   RTV   PHF   LTFR THFR RTFR
EB      0    71    78  .980      0   72   80
WB     85     0     0  .980     87    0    0
NB      0     0     0  .980      0    0    0
SB     82   293     0  .980     84  299    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N    LU     v  Plt  Prt
EB  TH           72 1 1.00    72 0.00 0.00
EB  RT           80 1 1.00    80 0.00 1.00
WB  LT           87 1 1.00    87 1.00 0.00
SB  LT           84 1 1.00    84 1.00 0.00
SB  TH          299 1 1.00   299 0.00 0.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED        VOLUMES       % OPPOSING LEFT TURN      # LANES       OPPOSING
                   LT    TH    RT       LT    TH    RT       LT  TH  RT       VOLUME
WESTBOUND           0    72    80      100   100     0        0   1   1          72
SOUTHBOUND          0     0     0        0     0     0        0   0   0           0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid    Fhv    Fgr  Fpark  Fbus  Farea   Frt    Flt     s
EB  TH        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604
EB  RT        1800  1 1.000 0.990 1.000 0.849 1.000 0.900 0.850 1.000 1157
WB  LT        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.921 1478
SB  LT        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
SB  TH        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
```

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DIR  C    G  N    Va    Vm   Vlt  Plt No    Vo Plto
WB  60   14  1    87     0    87 1.00  1    72 0.00
CALCULATIONS
DIR Sop     Yo      Gu     Fs     Pl      Gq     Pt      Gf        El     Fm    Flt
WB 1800 0.040 12.085 0.830 1.000   1.929 0.000  0.000    1.356 0.921 0.921

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP      v     s  v/s  g/C     c  v/c  CRITICAL
EB  TH           72 1604 0.05 0.23   375 0.19
EB  RT           80 1157 0.07 0.23   270 0.29      *
WB  LT           87 1478 0.06 0.23   345 0.25
SB  LT           84 1524 0.05 0.63   965 0.09
SB  TH          299 1604 0.19 0.63 1015 0.29      *

CYCLE= 60.0  LOST= 8.0  SUM V/S CRIT= 0.26 TOTAL V/C= 0.29

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C      d1     c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH        0.19 0.23  60.0  14.03   375    0.03 0.85   11.95  B    0.9
EB  RT        0.29 0.23  60.0  14.38   270    0.18 0.85   12.38  B    1.0
WB  LT        0.25 0.23  60.0  14.23   345    0.08 0.85   12.17  B    1.1
SB  LT        0.09 0.63  60.0   3.25   965    0.00 1.00    3.25  A    0.5
SB  TH        0.29 0.63  60.0   3.77  1015    0.05 0.85    3.25  A    1.8

DIR Delay LOS
EB  12.18  B
WB  12.17  B
SB   3.25  A
INTERSECTION DELAY =  6.68 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  10.9 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
OTIS/KINGSTON/SUMMER STREETS
EXISTING CONDITIONS: SAT PEAK HOUR
date:12-20-1988             time:16:39:44
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=KBI3SAT    GEOMETRICS=KBINT3     SIGNAL=KBINT3
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES       # OF LANES      LANE WIDTH      CROSS
DIR  LT    TH    RT    LT TH RT       LT    TH    RT     WALK
EB    0    50    80     0  1  1      0.0  12.0  12.0     25
WB  140     0     0     1  0  0     12.0   0.0   0.0     32
NB    0     0     0     0  0  0      0.0   0.0   0.0     32
SB   35   165     0     1  1  0     12.0  12.0   0.0     25

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                PEDESTRIANS        ARR
DIR GRADE %HV    Y/N MOVES BUSES   PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%    N    10     0   .920  200   N     11.0    3
WB  0.0%  2.0%    N     0     0   .920  150   N     11.0    3
NB  0.0%  0.0%          0     0   .000  200         11.0    3
SB  0.0%  2.0%    N     0     0   .920  200   N     11.0    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1     *  *     *                    *           *  25.3   4    A
 2           *           *              *  *        26.7   4    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0   50   80  .920     0   54   87
WB   140    0    0  .920   152    0    0
NB     0    0    0  .000     0    0    0
SB    35  165    0  .920    38  179    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU     v  Plt  Prt
EB  TH          54 1 1.00    54 0.00 0.00
EB  RT          87 1 1.00    87 0.00 1.00
WB  LT         152 1 1.00   152 1.00 0.00
SB  LT          38 1 1.00    38 1.00 0.00
SB  TH         179 1 1.00   179 0.00 0.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN     # LANES     OPPOSING
                 LT   TH   RT       LT   TH   RT       LT  TH  RT     VOLUME
WESTBOUND         0   54   87      100  100    0        0   1   1       54
SOUTHBOUND        0    0    0        0    0    0        0   0   0        0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr  Fpark  Fbus  Farea   Frt   Flt     s
EB  TH         1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604
EB  RT         1800  1 1.000 0.990 1.000 1.000 1.000 0.900 0.755 1.000 1211
WB  LT         1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.874 1402
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SB  LT        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
SB  TH        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N    Va    Vm  Vlt  Plt No    Vo Plto
WB  60  25  1  152     0  152 1.00  1    54 0.00
CALCULATIONS
DIR Sop    Yo     Gu     Fs     Pl      Gq     Pt      Gf        El     Fm    Flt
WB 1800 0.030 24.188 0.841 1.000  1.081 0.000  0.000     1.338 0.874 0.874

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v     s  v/s  g/C    c  v/c  CRITICAL
EB  TH          54  1604 0.03 0.42  676 0.08
EB  RT          87  1211 0.07 0.42  510 0.17
WB  LT         152  1402 0.11 0.42  590 0.26     *
SB  LT          38  1524 0.02 0.45  679 0.06
SB  TH         179  1604 0.11 0.45  715 0.25     *

CYCLE= 60.0  LOST= 8.0  SUM V/S CRIT= 0.22 TOTAL V/C= 0.25

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C      d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH        0.08 0.42  60.0   7.91  676    0.00 0.85    6.72  B   0.5     1
EB  RT        0.17 0.42  60.0   8.23  510    0.02 0.85    7.01  B   0.8     1
WB  LT        0.26 0.42  60.0   8.57  590    0.05 0.85    7.33  B   1.5     2
SB  LT        0.06 0.45  60.0   7.19  679    0.00 1.00    7.19  B   0.4     1
SB  TH        0.25 0.45  60.0   7.89  715    0.04 0.85    6.74  B   1.7     2

DIR Delay LOS
EB   6.90  B
WB   7.33  B
SB   6.82  B
INTERSECTION DELAY =  6.99 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  10.4 SECONDS
for chosen cycle length  60.0
suggested timing phase 1 is  25.6 secs green,   4.0 secs yellow + red clear
suggested timing phase 2 is  26.4 secs green,   4.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 1 of 2)
DATE:12-16-1988             TIME:10:14:47
BEDFORD/COLUMBIA EXISTING CONDITIONS: AM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=KBI4AM     GEOMETRICS=KBINT4
KEY: A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: N

MINOR STREET LANES
APPROACH: C: COLUMBIA NB
SHARED LEFT AND RIGHT TURN LANE: YES
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO


SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: BEDFORD EB  B: BEDFORD WB  C: COLUMBIA NB
LEFTS             0.00           0.00           0.00
THRUS             0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00


APPROACH        A: BEDFORD EB  B: BEDFORD WB  C: COLUMBIA NB
                 LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0    0    1    0  436    0   10    0    0
PHF               0.77           0.77           0.77
ADJ VOLUME        0    0    1    0  566    0   13    0    0
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR       0              0             14    0    0


STEP 1 RIGHT TURNS FROM     C:COLUMBIA NB
CONFLICTING FLOWS                        1
CRITICAL GAPS                          5.0
CAPACITY                              1199
ACTUAL CAPACITY                       1199


STEP 2 LEFT TURNS FROM     B:BEDFORD WB
CONFLICTING FLOWS                        1
CRITICAL GAPS                          4.5
CAPACITY                              1308
CAPACITY USED                            0%
IMPEDANCE FACTOR                      1.00
ACTUAL CAPACITY                       1308
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1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 2 of 2)
DATE:12-16-1988             TIME:10:14:47
BEDFORD/COLUMBIA EXISTING CONDITIONS: AM PEAK HOUR

STEP 3 LEFT TURNS FROM      C:COLUMBIA NB
CONFLICTING FLOWS                      567
CRITICAL GAPS                          6.0
CAPACITY                               503
ACTUAL CAPACITY                        503

                   SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT                  DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUE


ALL MOVES FROM C:           14        503        489      A      7.36          0.03
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 1 of 2)
DATE:11-29-1988             TIME:12:51:33
BEDFORD/COLUMBIA EXISTING CONDITIONS: PM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=KBI4PM      GEOMETRICS=KBINT4
KEY: A- -B
        |
        C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: N

MINOR STREET LANES
APPROACH: C: COLUMBIA NB
SHARED LEFT AND RIGHT TURN LANE: YES
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO


SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH          A: BEDFORD EB  B: BEDFORD WB  C: COLUMBIA NB
LEFTS               0.00           0.00           0.00
THRUS               0.00           0.00           0.00
RIGHTS              0.00           0.00           0.00


APPROACH          A: BEDFORD EB  B: BEDFORD WB  C: COLUMBIA NB
                   LT    TH   RT   LT    TH   RT   LT    TH   RT
VOLUME              0     0    1    0   155    0   21     0    0
PHF                0.94            0.94            0.94
ADJ VOLUME          0     0    1    0   165    0   22     0    0
PERCENT GRADE      0.00            0.00            0.00
PASS CAR/HR         0               0              25     0    0


STEP 1 RIGHT TURNS FROM     C:COLUMBIA NB
CONFLICTING FLOWS                       1
CRITICAL GAPS                         5.0
CAPACITY                             1199
ACTUAL CAPACITY                      1199


STEP 2 LEFT TURNS FROM     B:BEDFORD WB
CONFLICTING FLOWS                       1
CRITICAL GAPS                         4.5
CAPACITY                             1308
CAPACITY USED                          0%
IMPEDANCE FACTOR                     1.00
ACTUAL CAPACITY                      1308
```

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1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 2 of 2)
DATE:12-16-1988             TIME:10:14:47
BEDFORD/COLUMBIA EXISTING CONDITIONS: AM PEAK HOUR


STEP 3 LEFT TURNS FROM     C:COLUMBIA NB
CONFLICTING FLOWS                    567
CRITICAL GAPS                        6.0
CAPACITY                             503
ACTUAL CAPACITY                      503


                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT               DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUEUE


ALL MOVES FROM C:         14         503       489     A       7.36          0.03
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 1 of 2)
DATE:11-29-1988             TIME:12:51:33
BEDFORD/COLUMBIA EXISTING CONDITIONS: PM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=KBI4PM     GEOMETRICS=KBINT4
KEY: A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: N

MINOR STREET LANES
APPROACH: C: COLUMBIA NB
SHARED LEFT AND RIGHT TURN LANE: YES
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO


SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH          A: BEDFORD EB  B: BEDFORD WB  C: COLUMBIA NB
LEFTS               0.00           0.00           0.00
THRUS               0.00           0.00           0.00
RIGHTS              0.00           0.00           0.00


APPROACH          A: BEDFORD EB  B: BEDFORD WB  C: COLUMBIA NB
                   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME             0     0    1    0  155    0   21    0    0
PHF                0.94           0.94           0.94
ADJ VOLUME         0     0    1    0  165    0   22    0    0
PERCENT GRADE      0.00           0.00           0.00
PASS CAR/HR        0              0              25    0    0


STEP 1 RIGHT TURNS FROM     C:COLUMBIA NB
CONFLICTING FLOWS                       1
CRITICAL GAPS                         5.0
CAPACITY                             1199
ACTUAL CAPACITY                      1199


STEP 2 LEFT TURNS FROM     B:BEDFORD WB
CONFLICTING FLOWS                       1
CRITICAL GAPS                         4.5
CAPACITY                             1308
CAPACITY USED                           0%
IMPEDANCE FACTOR                     1.00
ACTUAL CAPACITY                      1308
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1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 2 of 2)
DATE:11-29-1988             TIME:12:59:59
BEDFORD/COLUMBIA EXISTING CONDITIONS: SAT PEAK HOUR


STEP 3 LEFT TURNS FROM     C:COLUMBIA NB
CONFLICTING FLOWS                      241
CRITICAL GAPS                          6.0
CAPACITY                               768
ACTUAL CAPACITY                        768

                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT               DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUEUE


ALL MOVES FROM C:         24        768       744     A       4.84          0.03
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:12-16-1988             TIME:10:21:25
KINGSTON/BEDFORD EXISTING CONDITIONS: AM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=KBI5AM     GEOMETRICS=KBINT5
KEY:   D
       |
     A-|-B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
          FROM D: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: KINGSTON NB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: KINGSTON SB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: BEDFORD EB  B: BEDFORD WB  C: KINGSTON NB D: KINGSTON SB
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: BEDFORD EB  B: BEDFORD WB  C: KINGSTON NB D: KINGSTON SB
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0    0   71   63  253    0    0    1    0    0  163   84
PHF               0.88           0.88           0.88           0.88
ADJ VOLUME        0    0   81   72  288    0    0    1    0    0  185   95
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR       0             79              0    1    0    0  204  105

STEP 1 RIGHT TURNS FROM     C:KINGSTON NB            D:KINGSTON SB
CONFLICTING FLOWS                       40                 144
CRITICAL GAPS                          5.0                 5.0
CAPACITY                              1154                1041
CAPACITY USED                            0%                 10%
IMPEDANCE FACTOR                      1.00                0.94
ACTUAL CAPACITY                       1154                1041
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1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:12-16-1988           TIME:10:21:25
KINGSTON/BEDFORD EXISTING CONDITIONS: AM PEAK HOUR

STEP 2 LEFT TURNS FROM     B:BEDFORD WB                A:BEDFORD EB
CONFLICTING FLOWS                    81                         288
CRITICAL GAPS                       4.5                         4.5
CAPACITY                           1220                        1010
CAPACITY USED                        6%                          0%
IMPEDANCE FACTOR                   0.96                        1.00
ACTUAL CAPACITY                    1220                        1010

STEP 3 THRU MOVES FROM     C:KINGSTON NB               D:KINGSTON SB
CONFLICTING FLOWS                   399                         440
CRITICAL GAPS                       5.5                         5.5
CAPACITY                            705                         672
CAPACITY USED                        0%                         30%
IMPEDANCE FACTOR                   1.00                        0.77
ACTUAL CAPACITY                     680                         648

STEP 4 LEFT TURNS FROM     C:KINGSTON NB               D:KINGSTON SB
CONFLICTING FLOWS                   680                         441
CRITICAL GAPS                       6.0                         6.0
CAPACITY                            432                         595
ACTUAL CAPACITY                     300                         573

                   SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT                 DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUE

LT FROM B:                 79        1220      1141     A       3.16           0.07

ALL MOVES FROM C:           1         680       679     A       5.30           0.00

ALL MOVES FROM D:         309         743       435     A       8.28           0.71
```

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:11-23-1988             TIME:11:26:59
KINGSTON/BEDFORD EXISTING CONDITIONS: PM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=KBI5PM     GEOMETRICS=KBINT5
KEY:   D
       |
     A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
          FROM D: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: KINGSTON NB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: KINGSTON SB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: BEDFORD EB  B: BEDFORD WB  C: KINGSTON NB D: KINGSTON SB
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: BEDFORD EB  B: BEDFORD WB  C: KINGSTON NB D: KINGSTON SB
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0    0  158  116  160    0    0    1    0    0  350  150
PHF               0.94           0.94           0.94           0.94
ADJ VOLUME        0    0  168  123  170    0    0    1    0    0  372  160
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR       0            136              0    1    0    0  410  176

STEP 1 RIGHT TURNS FROM     C:KINGSTON NB            D:KINGSTON SB
CONFLICTING FLOWS                       84                  85
CRITICAL GAPS                          5.0                 5.0
CAPACITY                              1105                1104
CAPACITY USED                            0%                 16%
IMPEDANCE FACTOR                      1.00                0.89
ACTUAL CAPACITY                       1105                1104
```

```
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:11-23-1988             TIME:11:26:59
KINGSTON/BEDFORD EXISTING CONDITIONS: PM PEAK HOUR

STEP 2 LEFT TURNS FROM      B:BEDFORD WB             A:BEDFORD EB
CONFLICTING FLOWS                     168                      170
CRITICAL GAPS                         4.5                      4.5
CAPACITY                             1127                     1125
CAPACITY USED                         12%                       0%
IMPEDANCE FACTOR                     0.92                     1.00
ACTUAL CAPACITY                      1127                     1125

STEP 3 THRU MOVES FROM      C:KINGSTON NB            D:KINGSTON SB
CONFLICTING FLOWS                     378                      462
CRITICAL GAPS                         5.5                      5.5
CAPACITY                              724                      655
CAPACITY USED                          0%                      63%
IMPEDANCE FACTOR                     1.00                     0.44
ACTUAL CAPACITY                       668                      605

STEP 4 LEFT TURNS FROM      C:KINGSTON NB            D:KINGSTON SB
CONFLICTING FLOWS                     910                      463
CRITICAL GAPS                         6.0                      6.0
CAPACITY                              312                      578
ACTUAL CAPACITY                       115                      534

                   SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT              DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUE

LT FROM B:              136       1127       992     A       3.63         0.14

ALL MOVES FROM C:         1        668       667     A       5.39         0.00

ALL MOVES FROM D:       585        700       115     D      31.41         5.10
```

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:12-20-1988             TIME:16:52:40
KINGSTON/BEDFORD EXISTIONG CONDITIONS: SAT PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=KBI5SAT    GEOMETRICS=KBINT5
KEY:    D
        |
    A-  -B
        |
        C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: YIELD
          FROM D: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: KINGSTON NB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: KINGSTON SB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: BEDFORD EB  B: BEDFORD WB  C: KINGSTON NB D: KINGSTON SB
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: BEDFORD EB  B: BEDFORD WB  C: KINGSTON NB D: KINGSTON SB
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0    0  116   88  128    0    0    0    1    0  215  170
PHF               0.92           0.92           0.92           0.92
ADJ VOLUME        0    0  126   96  139    0    0    0    1    0  234  185
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR       0             105             0    0    1    0  257  203

STEP 1 RIGHT TURNS FROM     C:KINGSTON NB             D:KINGSTON SB
CONFLICTING FLOWS                     63                        70
CRITICAL GAPS                        4.5                       5.0
CAPACITY                            1239                      1121
CAPACITY USED                          0%                       18%
IMPEDANCE FACTOR                    1.00                      0.88
ACTUAL CAPACITY                     1239                      1121
```

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1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:12-20-1988             TIME:16:52:40
KINGSTON/BEDFORD EXISTIONG CONDITIONS: SAT PEAK HOUR

STEP 2 LEFT TURNS FROM      B:BEDFORD WB              A:BEDFORD EB
CONFLICTING FLOWS                      126                       139
CRITICAL GAPS                          4.5                       4.5
CAPACITY                              1171                      1157
CAPACITY USED                            9%                        0%
IMPEDANCE FACTOR                      0.95                      1.00
ACTUAL CAPACITY                       1171                      1157


STEP 3 THRU MOVES FROM      C:KINGSTON NB             D:KINGSTON SB
CONFLICTING FLOWS                      298                       361
CRITICAL GAPS                          5.0                       5.5
CAPACITY                               888                       738
CAPACITY USED                            0%                       35%
IMPEDANCE FACTOR                      1.00                      0.73
ACTUAL CAPACITY                        840                       699


STEP 4 LEFT TURNS FROM      C:KINGSTON NB             D:KINGSTON SB
CONFLICTING FLOWS                      716                       362
CRITICAL GAPS                          5.5                       6.0
CAPACITY                               478                       659
ACTUAL CAPACITY                        287                       623


                     SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT                DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUEUE

LT FROM B:                105       1171      1066     A       3.38          0.10

ALL MOVES FROM C:           1       1239      1238     A       2.91          0.00

ALL MOVES FROM D:         460        838       378     B       9.53          1.22
```

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:12-16-1988             TIME:10:29:35
BEDFORD/CHAUNCY/LP GARAGE EXISTING CONDITIONS: AM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=KBI6AM     GEOMETRICS=KBINT6
KEY:   D
       |
     A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
          FROM D: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: YES
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: LP GARAGE EXIT
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: BEDFORD ST WB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: CHAUNCY ST  B: CHAUNCY ST  C: LP GARAGE E D: BEDFORD ST
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: CHAUNCY ST  B: CHAUNCY ST  C: LP GARAGE E D: BEDFORD ST
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME           16  128   63    0    1    0    2    8    0  171  108   53
PHF               0.92           0.92           0.92           0.92
ADJ VOLUME       17  139   68    0    1    0    2    9    0  186  117   58
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR      19               0              2   10    0  204  129   63

STEP 1 RIGHT TURNS FROM     C:LP GARAGE EXIT         D:BEDFORD ST WB
CONFLICTING FLOWS                       70                    1
CRITICAL GAPS                          5.0                  5.0
CAPACITY                              1121                 1199
CAPACITY USED                            0%                   5%
IMPEDANCE FACTOR                      1.00                 0.97
ACTUAL CAPACITY                       1121                 1199
```

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1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:12-16-1988             TIME:10:29:35
BEDFORD/CHAUNCY/LP GARAGE EXISTING CONDITIONS: AM PEAK HOUR

STEP 2 LEFT TURNS FROM     B:CHAUNCY ST SB           A:CHAUNCY ST NB
CONFLICTING FLOWS                      139                         1
CRITICAL GAPS                          4.5                       4.5
CAPACITY                              1157                      1308
CAPACITY USED                           0%                        1%
IMPEDANCE FACTOR                      1.00                      0.99
ACTUAL CAPACITY                       1157                      1308


STEP 3 THRU MOVES FROM     C:LP GARAGE EXIT          D:BEDFORD ST WB
CONFLICTING FLOWS                      158                       158
CRITICAL GAPS                          5.5                       5.5
CAPACITY                               932                       932
CAPACITY USED                           1%                       14%
IMPEDANCE FACTOR                      1.00                      0.91
ACTUAL CAPACITY                        926                       926


STEP 4 LEFT TURNS FROM     C:LP GARAGE EXIT          D:BEDFORD ST WB
CONFLICTING FLOWS                      333                       166
CRITICAL GAPS                          6.0                       6.0
CAPACITY                               684                       842
ACTUAL CAPACITY                        601                       834


                      SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT                 DEMAND    CAPACITY  RESERVE    LOS  AVG DEL(SEC) AVG QUE

LT FROM A:                   19        1308     1289     A       2.79         0.01

ALL MOVES FROM C:            12         836      824     A       4.37         0.01

ALL MOVES FROM D:           397         907      510     A       7.06         0.78
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:12-16-1988               TIME:15:28:51
BEDFORD/CHAUNCY/LP GARAGE ~~ALTERNATIVE~~ 1 CONDITIONS: PM PEAK HOUR
                           EXISTING

LAST DATASETS LOADED OR SAVED
VOLUME=KBI6PM     GEOMETRICS=KBINT6
KEY:   D
       |
    A-   -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
          FROM D: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: YES
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: LP GARAGE EXIT
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: BEDFORD ST WB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH       A: CHAUNCY ST  B: CHAUNCY ST  C: LP GARAGE E D: BEDFORD ST
LEFTS            0.00           0.00           0.00           0.00
THRUS            0.00           0.00           0.00           0.00
RIGHTS           0.00           0.00           0.00           0.00


APPROACH       A: CHAUNCY ST  B: CHAUNCY ST  C: LP GARAGE E D: BEDFORD ST
                LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME          15  140   49    0    1    0   26  109   45  180   80   50
PHF              0.89          0.89           0.89           0.89
ADJ VOLUME      17  157   55    0    1    0   29  122   51  202   90   56
PERCENT GRADE    0.00          0.00           0.00
PASS CAR/HR     19             0              32  135   56  222   99   62

STEP 1 RIGHT TURNS FROM     C:LP GARAGE EXIT          D:BEDFORD ST WB
CONFLICTING FLOWS                    79                       1
CRITICAL GAPS                       5.0                     5.0
CAPACITY                           1111                    1199
CAPACITY USED                         5%                      5%
IMPEDANCE FACTOR                   0.97                    0.97
ACTUAL CAPACITY                    1111                    1199
```

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1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:12-16-1988              TIME:15:28:51
BEDFORD/CHAUNCY/LP GARAGE ALTERNATIVE 1 CONDITIONS: PM PEAK HOUR

STEP 2 LEFT TURNS FROM     B:CHAUNCY ST SB          A:CHAUNCY ST NB
CONFLICTING FLOWS                      157                        1
CRITICAL GAPS                          4.5                      4.5
CAPACITY                              1138                     1308
CAPACITY USED                           0%                       1%
IMPEDANCE FACTOR                      1.00                     0.99
ACTUAL CAPACITY                       1138                     1308


STEP 3 THRU MOVES FROM     C:LP GARAGE EXIT         D:BEDFORD ST WB
CONFLICTING FLOWS                      175                      175
CRITICAL GAPS                          5.5                      5.5
CAPACITY                               913                      913
CAPACITY USED                          15%                      11%
IMPEDANCE FACTOR                      0.90                     0.93
ACTUAL CAPACITY                        908                      908


STEP 4 LEFT TURNS FROM     C:LP GARAGE EXIT         D:BEDFORD ST WB
CONFLICTING FLOWS                      321                      348
CRITICAL GAPS                          6.0                      6.0
CAPACITY                               694                      670
ACTUAL CAPACITY                        626                      586


                      SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT                 DEMAND    CAPACITY  RESERVE    LOS  AVG DEL(SEC) AVG QUEUE

LT FROM A:                  19       1308      1289      A       2.79         0.01

ALL MOVES FROM C:          222        891       668      A       5.39         0.33

ALL MOVES FROM D:          383        709       326      B      11.04         1.18
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:12-20-1988             TIME:16:50:27
BEDFORD/CHAUNCY/LP GARAGE EXISITNG CONDITIONS: SAT PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=KBI6SAT    GEOMETRICS=KBINT6
KEY:    D
        |
     A- -B
        |
        C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
          FROM D: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: YES
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: LP GARAGE EXIT
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: BEDFORD ST WB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: CHAUNCY ST  B: CHAUNCY ST  C: LP GARAGE E D: BEDFORD ST
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: CHAUNCY ST  B: CHAUNCY ST  C: LP GARAGE E D: BEDFORD ST
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME           10  117   86    0    0    1    9   30    3  185   30   89
PHF               0.85           0.85           0.85           0.85
ADJ VOLUME       12  138  101    0    0    1   11   35    4  218   35  105
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR      13              0             12   39    4  239   39  115


STEP 1 RIGHT TURNS FROM      C:LP GARAGE EXIT          D:BEDFORD ST WB
CONFLICTING FLOWS                     69                        1
CRITICAL GAPS                        5.0                      5.0
CAPACITY                            1122                     1199
CAPACITY USED                         0%                      10%
IMPEDANCE FACTOR                    1.00                     0.94
ACTUAL CAPACITY                     1122                     1199
```

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1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:12-20-1988             TIME:16:50:27
BEDFORD/CHAUNCY/LP GARAGE EXISITNG CONDITIONS: SAT PEAK HOUR

STEP 2 LEFT TURNS FROM     B:CHAUNCY ST SB          A:CHAUNCY ST NB
CONFLICTING FLOWS                      138                        1
CRITICAL GAPS                          4.5                      4.5
CAPACITY                              1159                     1308
CAPACITY USED                           0%                       1%
IMPEDANCE FACTOR                      1.00                     1.00
ACTUAL CAPACITY                       1159                     1308


STEP 3 THRU MOVES FROM     C:LP GARAGE EXIT         D:BEDFORD ST WB
CONFLICTING FLOWS                      151                      150
CRITICAL GAPS                          5.5                      5.5
CAPACITY                               939                      940
CAPACITY USED                           4%                       4%
IMPEDANCE FACTOR                      0.98                     0.98
ACTUAL CAPACITY                        936                      936


STEP 4 LEFT TURNS FROM     C:LP GARAGE EXIT         D:BEDFORD ST WB
CONFLICTING FLOWS                      291                      189
CRITICAL GAPS                          6.0                      6.0
CAPACITY                               721                      819
ACTUAL CAPACITY                        663                      798


                      SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT                 DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUE

LT FROM A:                  13       1308      1295     A      2.78          0.01

ALL MOVES FROM C:           54        869       815     A      4.42          0.07

ALL MOVES FROM D:          393        899       506     A      7.12          0.78
```

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/SURFACE ARTERY/LINCOLN STREETS
EXISTING CONDITIONS: AM PEAK HOUR
date:11-28-1988             time:10:49:58
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=KBI7AM     GEOMETRICS=KBINT7A    SIGNAL=KBINT7
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES        # OF LANES      LANE WIDTH      CROSS
DIR  LT    TH    RT     LT  TH  RT      LT    TH    RT    WALK
EB  114   511    86      1   3   1    12.0  12.0  15.0    52
WB   50   853    19      0   3   0     0.0  12.0   0.0    30
NB   37   491    12      0   3   0     0.0  11.0   0.0    56
SB   74   686     7      0   3   1     0.0  11.0  15.0    66

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                 PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF  CROSS BUT MIN TIME  TYPE
EB  0.0%  2.0%   N     0    10   .870   30   Y    12.0     3
WB  0.0%  2.0%   Y    10    10   .870  200   Y    12.0     3
NB  0.0%  2.0%   N     0    20   .870   90   Y    15.5     3
SB  0.0%  2.0%   N     0    25   .870  380   Y    15.5     3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *                          *           *  10.4   4    A
 2           *           *  *  *  *     *  *  *     13.0   4    A
 3           *           *              *  *  *      0.1   4    A
 4              *  *  *              *           *  20.5   4    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR   LTV  THV  RTV   PHF  LTFR THFR RTFR
EB    114  511   86  .870   131  587   99
WB     50  853   19  .870    57  980   22
NB     37  491   12  .870    43  564   14
SB     74  686    7  .870    85  789    8

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU     v  Plt  Prt
EB  LT         131 1 1.00   131 1.00 0.00
EB  TH         587 3 1.10   646 0.00 0.00
EB  RT          99 1 1.00    99 0.00 1.00
WB  LT-TH-RT  1060 3 1.10  1166 0.05 0.02
NB  LT-TH-RT   621 3 1.10   683 0.07 0.02
SB  LT-TH      874 3 1.10   961 0.10 0.00
SB  RT           8 1 1.00     8 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                 OPPOSING APPROACH
BEING OPPOSED          VOLUMES       % OPPOSING LEFT TURN    # LANES      OPPOSING
                    LT   TH   RT        LT    TH    RT       LT  TH  RT     VOLUME
EASTBOUND           57  980   22         0     0     0        0   3   0         0
WESTBOUND          131  587   99         0     0     0        1   3   1         0
NORTHBOUND          85  789    8        76    76     0        0   3   1       665
```

```
SOUTHBOUND         43  564   14         100  100  100          0   3   0      621

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP   IDEAL N   Fwid    Fhv    Fgr Fpark  Fbus Farea   Frt    Flt     s
EB  LT          1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
EB  TH          1800  3 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 4812
EB  RT          1800  1 1.100 0.990 1.000 1.000 0.958 0.900 0.807 1.000 1365
WB  LT-TH-RT    1800  3 1.000 0.990 1.000 0.950 0.986 0.900 0.993 0.990 4429
NB  LT-TH-RT    1800  3 0.967 0.990 1.000 1.000 0.972 0.900 0.995 0.912 4101
SB  LT-TH       1800  3 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.941 4375
SB  RT          1800  1 1.100 0.990 1.000 1.000 0.896 0.900 0.836 1.000 1321

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C    G  N    Va    Vm   Vlt   Plt No    Vo Plto
NB  60   13  3   621   621    43 0.07  3   665 0.10
CALCULATIONS
DIR Sop     Yo     Gu     Fs     Pl      Gq     Pt     Gf        El    Fm   Flt
NB 4789 0.139  5.431 0.459 0.324  7.583 0.676  3.232    2.451 0.736 0.912

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v     s  v/s  g/C     c  v/c  CRITICAL
EB  LT          131 1524 0.09 0.17   265 0.49
EB  TH          646 4812 0.13 0.17   838 0.77      *
EB  RT           99 1365 0.07 0.17   238 0.42
WB  LT-TH-RT 1166 4429 0.26 0.34 1511 0.77      *
NB  LT-TH-RT  683 4101 0.17 0.22   890 0.77
SB  LT-TH       961 4375 0.22 0.28 1246 0.77      *
SB  RT            8 1321 0.01 0.28   376 0.02

CYCLE= 60.0  LOST=12.0  SUM V/S CRIT= 0.62 TOTAL V/C= 0.77

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C      d1     c       d2    PF    Delay LOS Avg Q  95% Q
EB  LT        0.49 0.17  60.0  17.02   265     1.21 1.00   18.23  C    1.8
EB  TH        0.77 0.17  60.0  17.97   838     3.11 0.85   17.92  C    8.1
EB  RT        0.42 0.17  60.0  16.77   238     0.70 0.85   14.85  B    1.4
WB  LT-TH-RT 0.77 0.34  60.0  13.43 1511     1.77 0.85   12.92  B   11.6
NB  LT-TH-RT 0.77 0.22  60.0  16.77   890     2.85 0.85   16.68  C    8.1
SB  LT-TH     0.77 0.28  60.0  14.95 1246     2.13 0.85   14.52  B   10.4
SB  RT        0.02 0.28  60.0  11.74   376     0.00 0.85    9.98  B    0.1

DIR Delay LOS
EB  17.62  C
WB  12.92  B
NB  16.68  C
SB  14.48  B
INTERSECTION DELAY = 15.14 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  34.2 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/SURFACE ARTERY/LINCOLN STREETS
EXISTING CONDITIONS: PM PEAK HOUR
date:12-20-1988             time:10:50:38
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=KBI7PM     GEOMETRICS=KBINT7PS   SIGNAL=KBINT7
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB  131  599  317     1  3  1    12.0 12.0 15.0    52
WB   34  407   12     0  2  0     0.0 12.0  0.0    30
NB   37  679   13     0  3  0     0.0 11.0  0.0    56
SB   35 1117    7     0  3  1     0.0 11.0 15.0    66

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0   10   .940   15   Y    12.0    3
WB  0.0%  2.0%   Y    10   10   .940  180   Y    12.0    3
NB  0.0%  2.0%   N     0   20   .940  100   Y    15.5    3
SB  0.0%  2.0%   N     0   25   .940  310   Y    15.5    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *                          *           *  18.0    4    A
 2           *           *  *  *  *     *  *  *     16.9    4    A
 3           *           *              *  *  *      0.7    4    A
 4              *  *  *              *           *  12.9    4    A

CYCLE=  64.4

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB   131  599  317  .940   139  637  337
WB    34  407   12  .940    36  433   13
NB    37  679   13  .940    39  722   14
SB    35 1117    7  .940    37 1188    7

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
EB  LT         139 1 1.00  139 1.00 0.00
EB  TH         637 3 1.10  701 0.00 0.00
EB  RT         337 1 1.00  337 0.00 1.00
WB  LT-TH-RT   482 2 1.05  506 0.08 0.03
NB  LT-TH-RT   776 3 1.10  853 0.05 0.02
SB  LT-TH     1226 3 1.10 1348 0.03 0.00
SB  RT           7 1 1.00    7 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT    VOLUME
EASTBOUND        36  433   13         0    0    0        0   2   0       0
WESTBOUND       139  637  337         0    0    0        1   3   1       0
NORTHBOUND       37 1188    7        78   78    0        0   3   1     959
SOUTHBOUND       39  722   14       100  100  100        0   3   0     776

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  LT        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
EB  TH        1800  3 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 4812
EB  RT          1800  1 1.100 0.990 1.000 1.000 0.958 0.900 0.802 1.000 1357
WB  LT-TH-RT    1800  2 1.000 0.990 1.000 0.925 0.979 0.900 0.992 0.985 2838
NB  LT-TH-RT    1800  3 0.967 0.990 1.000 1.000 0.972 0.900 0.996 0.848 3819
SB  LT-TH       1800  3 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.973 4525
SB  RT          1800  1 1.100 0.990 1.000 1.000 0.896 0.900 0.843 1.000 1332

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N    Va    Vm   Vlt  Plt No    Vo Plto
NB  64  17  3   776   776    39 0.05  3   959 0.03
CALCULATIONS
DIR Sop     Yo     Gu     Fs     Pl      Gq     Pt     Gf        El     Fm    Flt
NB 5108 0.188   5.864 0.276 0.330 10.990 0.670   3.605     4.082 0.544 0.848

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP      v     s  v/s  g/C     c  v/c  CRITICAL
EB  LT          139 1524 0.09 0.28   425 0.33
EB  TH          701 4812 0.15 0.28  1343 0.52
EB  RT          337 1357 0.25 0.28   379 0.89       *
WB  LT-TH-RT    506 2838 0.18 0.20   568 0.89       *
NB  LT-TH-RT    853 3819 0.22 0.26   999 0.85
SB  LT-TH      1348 4525 0.30 0.33  1513 0.89       *
SB  RT            7 1332 0.01 0.33   446 0.02

CYCLE= 64.4   LOST=12.0   SUM V/S CRIT= 0.72 TOTAL V/C= 0.89

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C      d1     c      d2   PF    Delay LOS Avg Q  95% Q
EB  LT         0.33 0.28  64.4   14.00   425    0.17 1.00   14.17  B   1.8     2
EB  TH         0.52 0.28  64.4   14.89 1343    0.30 0.85   12.91  B   8.2     8
EB  RT         0.89 0.28  64.4   16.93  379   15.56 0.85   27.62  D   4.8     9
WB  LT-TH-RT 0.89 0.20  64.4   19.05  568   11.41 0.85   25.89  D   6.9    11
NB  LT-TH-RT 0.85 0.26  64.4   17.18  999    5.16 0.85   18.98  C  10.2    13
SB  LT-TH      0.89 0.33  64.4   15.44 1513    5.06 0.85   17.42  C  14.6    19
SB  RT         0.02 0.33  64.4   10.90  446    0.00 0.85    9.27  B   0.1     1

DIR Delay  LOS
EB  17.27  C
WB  25.89  D
NB  18.98  C
SB  17.38  C
INTERSECTION DELAY = 18.81 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  64.4 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  50.6 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/SURFACE ARTERY/LINCOLN STREETS
EXISTING CONDITIONS: SAT PEAK HOUR
date:12-20-1988             time:16:46:05
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=KBI7SAT    GEOMETRICS=KBINT7PS   SIGNAL=KBINT7
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES        # OF LANES      LANE WIDTH      CROSS
DIR  LT   TH   RT      LT  TH  RT      LT   TH   RT     WALK
EB   40  455  240       1   3   1    12.0 12.0 15.0     52
WB   25  290    3       0   2   0     0.0 12.0  0.0     30
NB   65  450    2       0   3   0     0.0 11.0  0.0     56
SB   20  610   15       0   3   1     0.0 11.0 15.0     66

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                 PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0     0  .790   25   Y    16.0    3
WB  0.0%  2.0%   Y    10    10  .790    0   Y    16.0    3
NB  0.0%  2.0%   N     0     0  .790   50   Y    15.5    3
SB  0.0%  2.0%   N     0    25  .790   85   Y    15.5    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *                          *           *  18.2   4    A
 2           *           *  *  *  *     *  *  *     14.0   4    A
 3           *           *              *  *  *      0.0   0    A
 4              *  *  *              *           *  12.9   4    A

CYCLE=  56.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR   LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     40  455  240  .790    51  576  304
WB     25  290    3  .790    32  367    4
NB     65  450    2  .790    82  570    3
SB     20  610   15  .790    25  772   19

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N   LU     v  Plt  Prt
EB  LT           51 1 1.00    51 1.00 0.00
EB  TH          576 3 1.10   634 0.00 0.00
EB  RT          304 1 1.00   304 0.00 1.00
WB  LT-TH-RT    403 2 1.05   423 0.08 0.01
NB  LT-TH-RT    654 3 1.10   720 0.13 0.00
SB  LT-TH       797 3 1.10   877 0.03 0.00
SB  RT           19 1 1.00    19 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                 OPPOSING APPROACH
BEING OPPOSED       VOLUMES         % OPPOSING LEFT TURN      # LANES      OPPOSING
                  LT   TH   RT        LT    TH    RT        LT  TH  RT      VOLUME
EASTBOUND         32  367    4         0     0     0         0   2   0         0
WESTBOUND         51  576  304         0     0     0         1   3   1         0
NORTHBOUND        25  772   19       100   100     0         0   3   1       797
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SOUTHBOUND          82  570    3        100  100  100          0   3   0     654

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP   IDEAL N  Fwid    Fhv    Fgr Fpark  Fbus Farea    Frt    Flt     s
EB  LT          1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
EB  TH          1800  3 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 4812
EB  RT          1800  1 1.100 0.990 1.000 1.000 1.000 0.900 0.826 1.000 1458
WB  LT-TH-RT    1800  2 1.000 0.990 1.000 0.925 0.979 0.900 0.998 0.986 2859
NB  LT-TH-RT    1800  3 0.967 0.990 1.000 1.000 1.000 0.900 0.999 0.838 3895
SB  LT-TH       1800  3 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.978 4551
SB  RT          1800  1 1.100 0.990 1.000 1.000 0.896 0.900 0.838 1.000 1325

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C    G  N    Va    Vm   Vlt  Plt No    Vo Plto
NB  56   14  3   654   654    82 0.13  3   797 0.03
CALCULATIONS
DIR Sop     Yo      Gu     Fs     Pl     Gq     Pt     Gf        El     Fm    Flt
NB 5168 0.154  6.383 0.377 0.637  7.656 0.363  1.116     2.987 0.513 0.838

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP      v     s  v/s  g/C     c  v/c  CRITICAL
EB  LT           51 1524 0.03 0.33   496 0.10
EB  TH          634 4812 0.13 0.33  1566 0.40
EB  RT          304 1458 0.21 0.33   474 0.64     *
WB  LT-TH-RT    423 2859 0.15 0.23   660 0.64     *
NB  LT-TH-RT    720 3895 0.18 0.25   976 0.74
SB  LT-TH       877 4551 0.19 0.25  1141 0.77     *
SB  RT           19 1325 0.01 0.25   332 0.06

CYCLE= 56.0  LOST= 6.8  SUM V/S CRIT= 0.55 TOTAL V/C= 0.63

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C      d1     c      d2   PF    Delay LOS Avg Q  95% Q
EB  LT       0.10 0.33  56.0  10.02  496    0.00 1.00   10.02   B   0.5     1
EB  TH       0.40 0.33  56.0  11.15 1566    0.10 0.85    9.56   B   6.0     6
EB  RT       0.64 0.33  56.0  12.23  474    2.05 0.85   12.14   B   3.2     4
WB  LT-TH-RT 0.64 0.23  56.0  14.77  660    1.49 0.85   13.82   B   4.8     6
NB  LT-TH-RT 0.74 0.25  56.0  14.66  976    2.07 0.85   14.22   B   7.6     9
SB  LT-TH    0.77 0.25  56.0  14.80 1141    2.28 0.85   14.51   B   9.3    11
SB  RT       0.06 0.25  56.0  12.12  332    0.00 0.85   10.30   B   0.2     1

DIR Delay  LOS
EB  10.38  B
WB  13.82  B
NB  14.22  B
SB  14.43  B
INTERSECTION DELAY = 12.97 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  16.1 SECONDS
for chosen cycle length  60.0
suggested timing phase 1 is  20.2 secs green,   4.0 secs yellow + red clear
suggested timing phase 2 is  16.9 secs green,   4.0 secs yellow + red clear
suggested timing phase 3 is   0.0 secs green,  -2.2 secs yellow + red clear
suggested timing phase 4 is  14.3 secs green,   4.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:12-20-1988             TIME:10:18:33
KINGSTON/ESSEX/AVE DE LAFAYETTE EXISTING CONDITIONS: AM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=KBI9AM     GEOMETRICS=KBINT9A
KEY:    D
        |
     A- | -B
        |
        C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
          FROM D: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: YES
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: KINGSTON NB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: KINGSTON SB
EXCLUSIVE LEFT TURN LANES: YES
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH         A: ESSEX EB    B: ESSEX WB    C: KINGSTON NB D: KINGSTON SB
LEFTS              0.00           0.00           0.00           0.00
THRUS              0.00           0.00           0.00           0.00
RIGHTS             0.00           0.00           0.00           0.00


APPROACH         A: ESSEX EB    B: ESSEX WB    C: KINGSTON NB D: KINGSTON SB
                  LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME             0  555   25    0    0    1    0    0    1  191   82    0
PHF                0.94           0.94           0.94           0.94
ADJ VOLUME         0  590   27    0    0    1    0    0    1  203   87    0
PERCENT GRADE      0.00           0.00           0.00
PASS CAR/HR        0              0              0    0    1  224   96    0

STEP 1 RIGHT TURNS FROM     C:KINGSTON NB            D:KINGSTON SB
CONFLICTING FLOWS                     295                       1
CRITICAL GAPS                         5.0                     5.0
CAPACITY                              891                    1199
CAPACITY USED                          0%                      0%
IMPEDANCE FACTOR                     1.00                    1.00
ACTUAL CAPACITY                       891                    1199
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1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:12-20-1988             TIME:10:18:33
KINGSTON/ESSEX/AVE DE LAFAYETTE EXISTING CONDITIONS: AM PEAK HOUR

STEP 2 LEFT TURNS FROM     B:ESSEX WB               A:ESSEX EB
CONFLICTING FLOWS                      590                   1
CRITICAL GAPS                          4.5                 4.5
CAPACITY                               750                1308
CAPACITY USED                            0%                  0%
IMPEDANCE FACTOR                      1.00                1.00
ACTUAL CAPACITY                        750                1308

STEP 3 THRU MOVES FROM     C:KINGSTON NB            D:KINGSTON SB
CONFLICTING FLOWS                      591                 591
CRITICAL GAPS                          5.5                 5.5
CAPACITY                               559                 559
CAPACITY USED                            0%                 17%
IMPEDANCE FACTOR                      1.00                0.88
ACTUAL CAPACITY                        559                 559

STEP 4 LEFT TURNS FROM     C:KINGSTON NB            D:KINGSTON SB
CONFLICTING FLOWS                      679                 592
CRITICAL GAPS                          6.0                 6.0
CAPACITY                               432                 487
ACTUAL CAPACITY                        382                 487

                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT               DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QU


ALL MOVES FROM C:          1        891       889     A      4.05        0.0

LT FROM D:               224        487       263     C     13.69        0.8
SHARED TH/RT FROM D:      96        559       463     A      7.77        0.2
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:12-20-1988             TIME:10:37:30
KINGSTON/ESSEX/AVE DE LAFAYETTE EXISTING CONDITIONS: PM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=KBI9PM     GEOMETRICS=KBINT9P
KEY:   D
       |
     A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
          FROM D: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: YES
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: KINGSTON NB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: KINGSTON SB
EXCLUSIVE LEFT TURN LANES: YES
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: ESSEX EB    B: ESSEX WB    C: KINGSTON NB D: KINGSTON SB
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: ESSEX EB    B: ESSEX WB    C: KINGSTON NB D: KINGSTON SB
                 LT   TH    RT   LT   TH   RT   LT   TH   RT   LT   TH    RT
VOLUME            0  695    55    0    0    1    0    0    1  360  298    0
PHF               0.96           0.96           0.96           0.96
ADJ VOLUME        0  724    57    0    0    1    0    0    1  375  310    0
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR       0              0              0    0    1  413  341    0


STEP 1 RIGHT TURNS FROM     C:KINGSTON NB            D:KINGSTON SB
CONFLICTING FLOWS                      362                     1
CRITICAL GAPS                          5.0                   5.0
CAPACITY                               830                  1199
CAPACITY USED                            0%                    0%
IMPEDANCE FACTOR                      1.00                  1.00
ACTUAL CAPACITY                        830                  1199
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1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:12-20-1988             TIME:10:37:30
KINGSTON/ESSEX/AVE DE LAFAYETTE EXISTING CONDITIONS: PM PEAK HOUR

STEP 2 LEFT TURNS FROM     B:ESSEX WB                A:ESSEX EB
CONFLICTING FLOWS                       724                   1
CRITICAL GAPS                           4.5                 4.5
CAPACITY                                653                1308
CAPACITY USED                             0%                  0%
IMPEDANCE FACTOR                       1.00                1.00
ACTUAL CAPACITY                         653                1308

STEP 3 THRU MOVES FROM     C:KINGSTON NB             D:KINGSTON SB
CONFLICTING FLOWS                       725                 724
CRITICAL GAPS                           5.5                 5.5
CAPACITY                                472                 473
CAPACITY USED                             0%                 72%
IMPEDANCE FACTOR                       1.00                0.34
ACTUAL CAPACITY                         472                 473

STEP 4 LEFT TURNS FROM     C:KINGSTON NB             D:KINGSTON SB
CONFLICTING FLOWS                      1035                 726
CRITICAL GAPS                           6.0                 6.0
CAPACITY                                259                 405
ACTUAL CAPACITY                          88                 405

                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT               DEMAND     CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUEUE

ALL MOVES FROM C:          1        830        829     A      4.34         0.00

LT FROM D:               413        405         -7     F   INFINITE    INFINITE
SHARED TH/RT FROM D:     341        473        131     D     27.42         2.60
```

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:11-30-1988             TIME:15:24:49
KINGSTON/ESSEX/AVE DE LAFAYETTE EXISTING CONDITIONS: SAT PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=KBI9SAT    GEOMETRICS=KBINT9
KEY:   D
       |
     A-|-B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: YIELD
          FROM D: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: YES
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: KINGSTON NB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: KINGSTON SB
EXCLUSIVE LEFT TURN LANES: YES
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: ESSEX EB    B: ESSEX WB    C: KINGSTON NB D: KINGSTON SB
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: ESSEX EB    B: ESSEX WB    C: KINGSTON NB D: KINGSTON SB
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0  520   50    0    0    1    0    0    1  220  140    0
PHF               0.93           0.93           0.93           0.93
ADJ VOLUME        0  559   54    0    0    1    0    0    1  237  151    0
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR       0              0              0    0    1  260  166    0


STEP 1 RIGHT TURNS FROM     C:KINGSTON NB            D:KINGSTON SB
CONFLICTING FLOWS                      280                   1
CRITICAL GAPS                          4.5                 5.0
CAPACITY                              1017                1199
CAPACITY USED                            0%                  0%
IMPEDANCE FACTOR                      1.00                1.00
ACTUAL CAPACITY                       1017                1199
```

```
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:11-30-1988             TIME:15:24:49
KINGSTON/ESSEX/AVE DE LAFAYETTE EXISTING CONDITIONS: SAT PEAK HOUR

STEP 2 LEFT TURNS FROM      B:ESSEX WB                A:ESSEX EB
CONFLICTING FLOWS                       559                      1
CRITICAL GAPS                           4.5                    4.5
CAPACITY                                775                   1308
CAPACITY USED                             0%                     0%
IMPEDANCE FACTOR                       1.00                   1.00
ACTUAL CAPACITY                         775                   1308

STEP 3 THRU MOVES FROM      C:KINGSTON NB             D:KINGSTON SB
CONFLICTING FLOWS                       560                    560
CRITICAL GAPS                           5.0                    5.5
CAPACITY                                668                    581
CAPACITY USED                             0%                    28%
IMPEDANCE FACTOR                       1.00                   0.78
ACTUAL CAPACITY                         668                    581

STEP 4 LEFT TURNS FROM      C:KINGSTON NB             D:KINGSTON SB
CONFLICTING FLOWS                       711                    561
CRITICAL GAPS                           5.5                    6.0
CAPACITY                                481                    508
ACTUAL CAPACITY                         378                    507

                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT                    DEMAND    CAPACITY  RESERVE    LOS  AVG DEL(SEC) AVG QU


ALL MOVES FROM C:              1       1017      1016      A       3.54          0.0

LT FROM D:                   260        507       247      C      14.56          1.0
SHARED TH/RT FROM D:         166        581       416      A       8.66          0.4
```

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:11-30-1988             TIME:09:44:59
ESSEX/HARRISON EXISTING CONDITIONS: AM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=KBI10AM    GEOMETRICS=KBINT10A
KEY:   D
       |
     A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: YIELD
          FROM D: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: HARRISON NB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: HARRISON SB
EXCLUSIVE LEFT TURN LANES: YES
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: ESSEX EB    B: ESSEX WB    C: HARRISON NB D: HARRISON SB
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: ESSEX EB    B: ESSEX WB    C: HARRISON NB D: HARRISON SB
                 LT  TH   RT    LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME          200  528  115    0    0    1    0    0    1   67   69    0
PHF               0.91           0.91           0.91           0.91
ADJ VOLUME      220  580  126    0    0    1    0    0    1   74   76    0
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR     242              0              0    0    1   81   83    0

STEP 1 RIGHT TURNS FROM     C:HARRISON NB            D:HARRISON SB
CONFLICTING FLOWS                      353                   1
CRITICAL GAPS                          4.5                 5.0
CAPACITY                               948                1199
CAPACITY USED                            0%                  0%
IMPEDANCE FACTOR                      1.00                1.00
ACTUAL CAPACITY                        948                1199
```

```
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:11-30-1988            TIME:09:44:59
ESSEX/HARRISON EXISTING CONDITIONS: AM PEAK HOUR

STEP 2 LEFT TURNS FROM     B:ESSEX WB                 A:ESSEX EB
CONFLICTING FLOWS                     707                        1
CRITICAL GAPS                         4.5                      4.5
CAPACITY                              665                     1308
CAPACITY USED                           0%                      18%
IMPEDANCE FACTOR                     1.00                     0.87
ACTUAL CAPACITY                       665                     1308

STEP 3 THRU MOVES FROM     C:HARRISON NB              D:HARRISON SB
CONFLICTING FLOWS                     864                      927
CRITICAL GAPS                         5.0                      5.5
CAPACITY                              469                      363
CAPACITY USED                           0%                      23%
IMPEDANCE FACTOR                     1.00                     0.83
ACTUAL CAPACITY                       409                      316

STEP 4 LEFT TURNS FROM     C:HARRISON NB              D:HARRISON SB
CONFLICTING FLOWS                     940                      928
CRITICAL GAPS                         5.5                      6.0
CAPACITY                              356                      304
ACTUAL CAPACITY                       259                      265

                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT                  DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUEU

LT FROM A:                  242       1308      1066     A       3.38          0.23

ALL MOVES FROM C:             1        948       947     A       3.80          0.00

LT FROM D:                   81        265       184     D      19.57          0.44
SHARED TH/RT FROM D:         83        316       233     C      15.46          0.36
```

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:11-30-1988             TIME:13:56:26
ESSEX/HARRISON EXISTING CONDITIONS: PM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=KBI10PM    GEOMETRICS=KBINT10P
KEY:   D
       |
     A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: YIELD
          FROM D: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: YES
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: HARRISON NB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: HARRISON SB
EXCLUSIVE LEFT TURN LANES: YES
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: ESSEX EB    B: ESSEX WB    C: HARRISON NB D: HARRISON SB
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: ESSEX EB    B: ESSEX WB    C: HARRISON NB D: HARRISON SB
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME          160  632  107    0    0    1    0    0    1  159  200    0
PHF               0.94           0.94           0.94           0.94
ADJ VOLUME      170  672  114    0    0    1    0    0    1  169  213    0
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR     187              0              0    0    1  186  234    0


STEP 1 RIGHT TURNS FROM     C:HARRISON NB            D:HARRISON SB
CONFLICTING FLOWS                     336                      1
CRITICAL GAPS                         4.5                    5.0
CAPACITY                              964                   1199
CAPACITY USED                           0%                     0%
IMPEDANCE FACTOR                     1.00                   1.00
ACTUAL CAPACITY                       964                   1199
```

```
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:11-30-1988            TIME:13:56:26
ESSEX/HARRISON EXISTING CONDITIONS: PM PEAK HOUR

STEP 2 LEFT TURNS FROM      B:ESSEX WB                A:ESSEX EB
CONFLICTING FLOWS                      672                        1
CRITICAL GAPS                          4.5                      4.5
CAPACITY                               690                     1308
CAPACITY USED                           0%                      14%
IMPEDANCE FACTOR                      1.00                     0.91
ACTUAL CAPACITY                        690                     1308

STEP 3 THRU MOVES FROM      C:HARRISON NB             D:HARRISON SB
CONFLICTING FLOWS                      844                      843
CRITICAL GAPS                          5.0                      5.5
CAPACITY                               481                      405
CAPACITY USED                           0%                      58%
IMPEDANCE FACTOR                      1.00                     0.50
ACTUAL CAPACITY                        436                      367

STEP 4 LEFT TURNS FROM      C:HARRISON NB             D:HARRISON SB
CONFLICTING FLOWS                     1056                      844
CRITICAL GAPS                          5.5                      6.0
CAPACITY                               304                      343
ACTUAL CAPACITY                        137                      311

                      SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT                 DEMAND    CAPACITY  RESERVE    LOS  AVG DEL(SEC) AVG QUE

LT FROM A:                187       1308      1121       A       3.21          0.17

ALL MOVES FROM C:           1        964       963       A       3.74          0.00

LT FROM D:                186        311       125       D      28.90          1.49
SHARED TH/RT FROM D:      234        367       133       D      27.02          1.76
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:11-30-1988             TIME:10:30:49
ESSEX/HARRISON EXISTING CONDITIONS: SAT PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=KBI10SAT   GEOMETRICS=KBINT10A
KEY:   D
       |
     A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: YIELD
          FROM D: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: HARRISON NB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: HARRISON SB
EXCLUSIVE LEFT TURN LANES: YES
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: ESSEX EB    B: ESSEX WB    C: HARRISON NB D: HARRISON SB
LEFTS             0.00           0.00           0.00            0.00
THRUS             0.00           0.00           0.00            0.00
RIGHTS            0.00           0.00           0.00            0.00


APPROACH        A: ESSEX EB    B: ESSEX WB    C: HARRISON NB D: HARRISON SB
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME          146  445  160    0    0    1    0    0    1  200   90     0
PHF               0.77           0.77           0.77            0.77
ADJ VOLUME      190  578  208    0    0    1    0    0    1  260  117     0
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR     209              0              0    0    1  286  129     0

STEP 1 RIGHT TURNS FROM     C:HARRISON NB            D:HARRISON SB
CONFLICTING FLOWS                       393                   1
CRITICAL GAPS                           4.5                 5.0
CAPACITY                                913                1199
CAPACITY USED                            0%                   0%
IMPEDANCE FACTOR                       1.00                1.00
ACTUAL CAPACITY                         913                1199
```

```
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:11-30-1988              TIME:15:24:49
KINGSTON/ESSEX/AVE DE LAFAYETTE EXISTING CONDITIONS: SAT PEAK HOUR

STEP 2 LEFT TURNS FROM      B:ESSEX WB                A:ESSEX EB
CONFLICTING FLOWS                       559                        1
CRITICAL GAPS                           4.5                      4.5
CAPACITY                                775                     1308
CAPACITY USED                            0%                       0%
IMPEDANCE FACTOR                       1.00                     1.00
ACTUAL CAPACITY                         775                     1308

STEP 3 THRU MOVES FROM      C:KINGSTON NB             D:KINGSTON SB
CONFLICTING FLOWS                       560                      560
CRITICAL GAPS                           5.0                      5.5
CAPACITY                                668                      581
CAPACITY USED                            0%                      28%
IMPEDANCE FACTOR                       1.00                     0.78
ACTUAL CAPACITY                         668                      581

STEP 4 LEFT TURNS FROM      C:KINGSTON NB             D:KINGSTON SB
CONFLICTING FLOWS                       711                      561
CRITICAL GAPS                           5.5                      6.0
CAPACITY                                481                      508
ACTUAL CAPACITY                         378                      507

                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT                  DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUE


ALL MOVES FROM C:            1        1017      1016     A       3.54          0.00

LT FROM D:                 260         507       247     C      14.56          1.05
SHARED TH/RT FROM D:       166         581       416     A       8.66          0.40
```

```
CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:11-30-1988             TIME:09:44:59
ESSEX/HARRISON EXISTING CONDITIONS: AM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=KBI10AM    GEOMETRICS=KBINT10A
KEY:   D
       |
     A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: YIELD
          FROM D: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: HARRISON NB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: HARRISON SB
EXCLUSIVE LEFT TURN LANES: YES
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: ESSEX EB    B: ESSEX WB    C: HARRISON NB D: HARRISON SB
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: ESSEX EB    B: ESSEX WB    C: HARRISON NB D: HARRISON SB
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME          200  528  115    0    0    1    0    0    1   67   69    0
PHF               0.91           0.91           0.91           0.91
ADJ VOLUME      220  580  126    0    0    1    0    0    1   74   76    0
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR     242              0              0    0    1   81   83    0

STEP 1 RIGHT TURNS FROM     C:HARRISON NB            D:HARRISON SB
CONFLICTING FLOWS                      353                   1
CRITICAL GAPS                          4.5                 5.0
CAPACITY                               948                1199
CAPACITY USED                            0%                  0%
IMPEDANCE FACTOR                      1.00                1.00
ACTUAL CAPACITY                        948                1199
```

```
CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v    s  v/s  g/C     c  v/c  CRITICAL
EB  LT         215 1473 0.15 0.33   493 0.44
EB  TH         570 3101 0.18 0.33  1038 0.55       *
NB  TH         379 3101 0.12 0.57  1753 0.22
NB  RT         363 1170 0.31 0.57   662 0.55       *

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.49 TOTAL V/C= 0.55

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT       0.44 0.33  60.0  11.82  493    0.41 1.00  12.23  B    2.4     3
EB  TH       0.55 0.33  60.0  12.37 1038    0.49 0.85  10.92  B    6.0     6
NB  TH       0.22 0.57  60.0   4.91 1753    0.01 0.85   4.18  A    2.6     3
NB  RT       0.55 0.57  60.0   6.25  662    0.76 0.85   5.96  B    2.6     3

DIR Delay LOS
EB  11.28  B
NB   5.05  B
INTERSECTION DELAY =  8.25 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  12.5 SECONDS
THE EXISTING TIMING IS OPTIMAL
```

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/WASHINGTON
EXISTING CONDITIONS: PM PEAK HOUR
date:12-01-1988             time:08:28:55
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=KBI11PM     GEOMETRICS=KBINT11     SIGNAL=KBINT11
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES        # OF LANES      LANE WIDTH      CROSS
DIR  LT   TH   RT     LT TH RT       LT   TH   RT      WALK
EB  111  452    0      1  2  0     11.0 11.0  0.0      28
WB    0    0    0      0  0  0      0.0  0.0  0.0      31
NB    0  242  447      0  2  1      0.0 11.0 11.0      36
SB    0    0    0      0  0  0      0.0  0.0  0.0      36

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0     0  .910  200   Y    11.8     3
WB  0.0%  0.0%         0     0  .000  200        11.8     0
NB  0.0%  2.0%   N     0     0  .910  590   Y    13.0     3
SB  0.0%  0.0%         0     0  .000  750   Y    13.0     3

PHASINGS
    EASTBOUND    WESTBOUND    NORTHBOUND   SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *                                *           *  15.4   3    A
 2           *           *     *  *                    38.6   3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB   111  452    0  .910   122  497    0
WB     0    0    0  .000     0    0    0
NB     0  242  447  .910     0  266  491
SB     0    0    0  .000     0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
EB  LT         122 1 1.00  122 1.00 0.00
EB  TH         497 2 1.05  522 0.00 0.00
NB  TH         266 2 1.05  279 0.00 0.00
NB  RT         491 1 1.00  491 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED         VOLUMES       % OPPOSING LEFT TURN      # LANES      OPPOSINC
                   LT   TH   RT        LT   TH   RT        LT  TH  RT      VOLUME
EASTBOUND           0    0    0         0    0    0         0   0   0         0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt     s
EB  LT         1800 1 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1473
EB  TH         1800 2 0.967 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3101
NB  TH         1800 2 0.967 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3101
NB  RT         1800 1 0.967 0.990 1.000 1.000 1.000 0.900 0.755 1.000 1170

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT         122 1473 0.08 0.26  379 0.32
EB  TH         522 3101 0.17 0.26  798 0.65      *
NB  TH         279 3101 0.09 0.64 1993 0.14
NB  RT         491 1170 0.42 0.64  752 0.65      *
```

```
CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.59 TOTAL V/C= 0.65

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT       0.32 0.26  60.0  13.71  379    0.18 1.00   13.88  B   1.5
EB  TH       0.65 0.26  60.0  15.11  798    1.36 0.85   14.00  B   6.1
NB  TH       0.14 0.64  60.0   3.20 1993    0.00 0.85    2.72  A   1.6
NB  RT       0.65 0.64  60.0   5.02  752    1.44 0.85    5.49  B   2.9

DIR Delay LOS
EB  13.98  B
NB   4.49  A
INTERSECTION DELAY =  8.81 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  15.7 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/WASHINGTON
EXISTING CONDITIONS: SAT PEAK HOUR
date:12-01-1988             time:08:32:48
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=KBI11SAT   GEOMETRICS=KBINT11    SIGNAL=KBINT11
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES          # OF LANES      LANE WIDTH      CROSS
DIR  LT    TH    RT     LT TH RT       LT    TH    RT     WALK
EB  185   533    0      1  2  0     11.0 11.0  0.0      28
WB    0     0    0      0  0  0      0.0  0.0  0.0      31
NB    0   217  206      0  2  1      0.0 11.0 11.0      36
SB    0     0    0      0  0  0      0.0  0.0  0.0      36

TRAFFIC & ROADWAY CONDITIONS
                   ADJ PARK                PEDESTRIANS         ARR
DIR GRADE %HV    Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%    N     0     0  .900  200   Y     11.8     3
WB  0.0%  0.0%          0     0  .000  200         11.8     0
NB  0.0%  2.0%    N     0     0  .900  500   Y     13.0     3
SB  0.0%  0.0%          0     0  .000  600   Y     13.0     3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN   Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *                             *           *  27.3    3    A
 2           *           *     *  *                 26.7    3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR   LTV  THV  RTV    PHF   LTFR THFR RTFR
EB    185  533    0  .900    206  592    0
WB      0    0    0  .000      0    0    0
NB      0  217  206  .900      0  241  229
SB      0    0    0  .000      0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N   LU    v   Plt  Prt
EB  LT          206 1 1.00  206 1.00 0.00
EB  TH          592 2 1.05  622 0.00 0.00
NB  TH          241 2 1.05  253 0.00 0.00
NB  RT          229 1 1.00  229 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                  OPPOSING APPROACH
BEING OPPOSED        VOLUMES       % OPPOSING LEFT TURN      # LANES      OPPOSINC
                  LT   TH   RT         LT   TH   RT         LT  TH  RT      VOLUME
EASTBOUND          0    0    0          0    0    0          0   0   0           0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP   IDEAL N  Fwid   Fhv    Fgr Fpark  Fbus Farea   Frt   Flt     s
EB  LT          1800  1 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1473
EB  TH          1800  2 0.967 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3101
NB  TH          1800  2 0.967 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3101
NB  RT          1800  1 0.967 0.990 1.000 1.000 1.000 0.900 0.755 1.000 1170

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT         206 1473 0.14 0.46  671 0.31
EB  TH         622 3101 0.20 0.46 1413 0.44      *
NB  TH         253 3101 0.08 0.44 1378 0.18
NB  RT        229 1170 0.20 0.44  520 0.44      *

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.40 TOTAL V/C= 0.44

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C      d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT       0.31 0.46  60.0   7.85  671    0.09 1.00    7.94  B   1.9
EB  TH       0.44 0.46  60.0   8.45 1413    0.15 0.85    7.31  B   5.4
NB  TH       0.18 0.44  60.0   7.66 1378    0.01 0.85    6.52  B   2.2
NB  RT       0.44 0.44  60.0   8.75  520    0.40 0.85    7.78  B   2.1

DIR Delay LOS
EB   7.47  B
NB   7.12  B
INTERSECTION DELAY =  7.34 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  10.3 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:11-30-1988             TIME:10:46:26
BEACH/HARRISON EXISTING CONDITIONS: AM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=KBI12AM    GEOMETRICS=KBINT12A
KEY:   D
       |
     A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
          FROM D: YIELD
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: BEACH WB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: BEACH EB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: HARRISON NB B: HARRISON SB C: BEACH WB    D: BEACH EB
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: HARRISON NB B: HARRISON SB C: BEACH WB    D: BEACH EB
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0    0    1    0  166   18  169   86    0    0    0    1
PHF               0.88           0.88           0.88           0.88
ADJ VOLUME        0    0    1    0  189   20  192   98    0    0    0    1
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR       0              0            211  108    0    0    0    1

STEP 1 RIGHT TURNS FROM     C:BEACH WB               D:BEACH EB
CONFLICTING FLOWS                         1                 105
CRITICAL GAPS                           5.0                 4.5
CAPACITY                               1199                1194
CAPACITY USED                            0%                  0%
IMPEDANCE FACTOR                       1.00                1.00
ACTUAL CAPACITY                        1199                1194
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1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:11-30-1988             TIME:10:46:26
BEACH/HARRISON EXISTING CONDITIONS: AM PEAK HOUR

STEP 2 LEFT TURNS FROM     B:HARRISON SB            A:HARRISON NB
CONFLICTING FLOWS                      1                      209
CRITICAL GAPS                        4.5                      4.5
CAPACITY                            1308                     1086
CAPACITY USED                         0%                       0%
IMPEDANCE FACTOR                    1.00                     1.00
ACTUAL CAPACITY                     1308                     1086

STEP 3 THRU MOVES FROM     C:BEACH WB               D:BEACH EB
CONFLICTING FLOWS                    210                      200
CRITICAL GAPS                        5.5                      5.0
CAPACITY                             879                      983
CAPACITY USED                        12%                       0%
IMPEDANCE FACTOR                    0.92                     1.00
ACTUAL CAPACITY                      879                      983

STEP 4 LEFT TURNS FROM     C:BEACH WB               D:BEACH EB
CONFLICTING FLOWS                    211                      298
CRITICAL GAPS                        6.0                      5.5
CAPACITY                             797                      794
ACTUAL CAPACITY                      797                      733

                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT                 DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QU


ALL MOVES FROM C:          319        823       504     A       7.14          0.6

ALL MOVES FROM D:            1       1194      1193     A       3.02          0.0
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:11-30-1988             TIME:13:37:14
BEACH/HARRISON EXISTING CONDITIONS: PM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=KBI12PM    GEOMETRICS=KBINT12A
KEY:   D
       |
     A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
          FROM D: YIELD
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: BEACH WB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: BEACH EB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: HARRISON NB B: HARRISON SB C: BEACH WB    D: BEACH EB
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: HARRISON NB B: HARRISON SB C: BEACH WB    D: BEACH EB
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0    0    1    0  220   90  218  104    0    0    0    1
PHF               0.92           0.92           0.92           0.92
ADJ VOLUME        0    0    1    0  239   98  237  113    0    0    0    1
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR       0              0            261  124    0    0    0    1

STEP 1 RIGHT TURNS FROM     C:BEACH WB               D:BEACH EB
CONFLICTING FLOWS                        1                 168
CRITICAL GAPS                          5.0                 4.5
CAPACITY                              1199                1127
CAPACITY USED                            0%                  0%
IMPEDANCE FACTOR                      1.00                1.00
ACTUAL CAPACITY                       1199                1127
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1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:11-30-1988             TIME:13:37:14
BEACH/HARRISON EXISTING CONDITIONS: PM PEAK HOUR

STEP 2 LEFT TURNS FROM     B:HARRISON SB            A:HARRISON NB
CONFLICTING FLOWS                      1                    337
CRITICAL GAPS                        4.5                    4.5
CAPACITY                            1308                    963
CAPACITY USED                          0%                     0%
IMPEDANCE FACTOR                    1.00                   1.00
ACTUAL CAPACITY                     1308                    963


STEP 3 THRU MOVES FROM     C:BEACH WB               D:BEACH EB
CONFLICTING FLOWS                    338                    289
CRITICAL GAPS                        5.5                    5.0
CAPACITY                             759                    896
CAPACITY USED                         16%                     0%
IMPEDANCE FACTOR                    0.89                   1.00
ACTUAL CAPACITY                      759                    896


STEP 4 LEFT TURNS FROM     C:BEACH WB               D:BEACH EB
CONFLICTING FLOWS                    339                    402
CRITICAL GAPS                        6.0                    5.5
CAPACITY                             679                    703
ACTUAL CAPACITY                      679                    625


                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT               DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QU


ALL MOVES FROM C:        385        702       317     B     11.34          1.2

ALL MOVES FROM D:          1       1127      1126     A      3.20          0.0
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:11-30-1988             TIME:10:53:28
BEACH/HARRISON EXISTING CONDITIONS: SAT PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=I12ALT1A   GEOMETRICS=KBINT12A
KEY:   D
       |
     A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
          FROM D: YIELD
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: BEACH WB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: BEACH EB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: HARRISON NB B: HARRISON SB C: BEACH WB    D: BEACH EB
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: HARRISON NB B: HARRISON SB C: BEACH WB    D: BEACH EB
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0    0    1    0  200   50  200  160    0    0    0    1
PHF               0.94           0.94           0.94           0.94
ADJ VOLUME        0    0    1    0  213   53  213  170    0    0    0    1
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR       0              0            234  187    0    0    0    1


STEP 1 RIGHT TURNS FROM     C:BEACH WB               D:BEACH EB
CONFLICTING FLOWS                        1                  133
CRITICAL GAPS                          5.0                  4.5
CAPACITY                              1199                 1164
CAPACITY USED                            0%                   0%
IMPEDANCE FACTOR                      1.00                 1.00
ACTUAL CAPACITY                       1199                 1164
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1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:11-30-1988             TIME:10:53:28
BEACH/HARRISON EXISTING CONDITIONS: SAT PEAK HOUR

STEP 2 LEFT TURNS FROM      B:HARRISON SB                A:HARRISON NB
CONFLICTING FLOWS                        1                         266
CRITICAL GAPS                          4.5                         4.5
CAPACITY                              1308                        1030
CAPACITY USED                           0%                          0%
IMPEDANCE FACTOR                      1.00                        1.00
ACTUAL CAPACITY                       1308                        1030

STEP 3 THRU MOVES FROM      C:BEACH WB                   D:BEACH EB
CONFLICTING FLOWS                      266                         240
CRITICAL GAPS                          5.5                         5.0
CAPACITY                               824                         943
CAPACITY USED                          23%                          0%
IMPEDANCE FACTOR                      0.84                        1.00
ACTUAL CAPACITY                        824                         943

STEP 4 LEFT TURNS FROM      C:BEACH WB                   D:BEACH EB
CONFLICTING FLOWS                      268                         411
CRITICAL GAPS                          6.0                         5.5
CAPACITY                               743                         696
ACTUAL CAPACITY                        742                         582

                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT                 DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUEUE

ALL MOVES FROM C:          421        776       355     B      10.14         1.19

ALL MOVES FROM D:            1       1164      1163     A       3.10         0.00
```

LEVEL OF SERVICE CALCULATIONS:

NO BUILD (1993) CONDITIONS

(AM, PM and SAT peak hours)

- Summer/High/South
- Summer/Lincoln/Bedford
- Summer/Otis/Kingston
- Bedford/Columbia
- Bedford/Kingston
  (AM and SAT only)
- Bedford/Chauncy/LP Garage
- Surface Artery/Essex/Lincoln
- Essex/Kingston/Ave. DeLafayette
  (AM and SAT only)
- Essex/Harrison/Chauncy
  (AM and SAT only)
- Essex/Washington
- Harrison/Beach

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
SUMMER/HIGH/SOUTH STREETS
NO BUILD CONDITIONS: AM PEAK HOUR
date:12-16-1988             time:11:01:40
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I1NBAM     GEOMETRICS=KBINT1      SIGNAL=KBINT1
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES        # OF LANES      LANE WIDTH     CROSS
DIR  LT   TH   RT      LT TH RT      LT    TH    RT    WALK
EB   83   47  104       0  2  0     0.0  10.0   0.0    10
WB    0  325  135       0  2  1     0.0  12.0  11.0    33
NB  162  567    0       1  1  0    10.0  11.0   0.0    27
SB   14   47  143       0  1  1     0.0  12.0  12.0    38

TRAFFIC & ROADWAY CONDITIONS
                  ADJ PARK              PEDESTRIANS       ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   Y      0     0  .910  200   Y    11.3     3
WB  0.0%  2.0%   N      0    10  .920  400   Y    11.3     3
NB  0.0%  2.0%   N      0    30  .920  750   y    12.5     3
SB  0.0%  2.0%          0     0  .920 1100   y    12.5     3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *     *  *  *              *           *  21.8   4    A
 2           *           *  *  *  *     *  *  *     32.7   4    A

CYCLE=  62.5

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB    83   47  104  .910    91   52  114
WB     0  325  135  .920     0  353  147
NB   162  567    0  .920   176  616    0
SB    14   47  143  .920    15   51  155

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
EB  LT-TH-RT   257 2 1.05  270 0.35 0.44
WB  TH         353 2 1.05  371 0.00 0.00
WB  RT         147 1 1.00  147 0.00 1.00
NB  LT         176 1 1.00  176 1.00 0.00
NB  TH         616 1 1.00  616 0.00 0.00
SB  LT-TH       66 1 1.00   66 0.23 0.00
SB  RT         155 1 1.00  155 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN      # LANES      OPPOSINC
                  LT   TH   RT       LT   TH   RT        LT  TH  RT      VOLUME
EASTBOUND          0  353  147      100  100    0         0   2   1        353
NORTHBOUND        15   51  155      100  100    0         0   1   1         51
SOUTHBOUND       176  616    0      100  100  100         1   1   0        616

SATURATION FLOW ADJUSTMENT WORKSHEET
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```
DIR LN GROUP   IDEAL N  Fwid    Fhv    Fgr Fpark  Fbus Farea    Frt    Flt     s
EB  LT-TH-RT   1800  2 0.933 0.990 1.000 1.000 1.000 0.900 0.775 0.841 1951
WB  TH         1800  2 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3208
WB  RT         1800  1 0.967 0.990 1.000 1.000 0.958 0.900 0.326 1.000  485
NB  LT         1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.846 1266
NB  TH         1800  1 0.967 0.990 1.000 1.000 0.875 0.900 1.000 1.000 1357
SB  LT-TH      1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.658 1056
SB  RT         1800  1 1.000 0.990 1.000 1.000 1.000 0.900 0.755 1.000 1211

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
EB  63  22  2  257  257   91 0.35  2  353 0.00
NB  63  33  1  176  616  176 1.00  1   51 0.23
SB  63  33  1   66  207   15 0.23  1  616 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf        El    Fm   Flt
EB 3600 0.098 17.367 0.654 0.842  4.429 0.158  0.369     1.720 0.682 0.841
NB 1387 0.037 31.565 0.843 1.000  1.139 0.000  0.000     1.334 0.846 0.846
SB 1800 0.342 17.191 0.490 0.230 15.514 0.770  5.826     2.297 0.658 0.658

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH-RT  270 1951 0.14 0.35  680 0.40
WB  TH        371 3208 0.12 0.35 1119 0.33
WB  RT        147  485 0.30 0.35  169 0.87     *
NB  LT        176 1266 0.14 0.52  662 0.27
NB  TH        616 1357 0.45 0.52  710 0.87     *
SB  LT-TH      66 1056 0.06 0.52  553 0.12
SB  RT        155 1211 0.13 0.52  633 0.25

CYCLE= 62.5  LOST= 8.0  SUM V/S CRIT= 0.76 TOTAL V/C= 0.87

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.40 0.35  62.5  11.69  680    0.21 0.85   10.12  B    2.9
WB  TH       0.33 0.35  62.5  11.39 1119    0.07 0.85    9.74  B    4.0
WB  RT       0.87 0.35  62.5  14.45  169   23.95 0.85   32.64  D    2.2
NB  LT       0.27 0.52  62.5   6.27  662    0.05 0.85    5.37  B    1.5
NB  TH       0.87 0.52  62.5   9.89  710    7.87 0.85   15.10  C    5.1
SB  LT-TH    0.12 0.52  62.5   5.76  553    0.00 0.85    4.90  A    0.5
SB  RT       0.25 0.52  62.5   6.19  633    0.04 0.85    5.30  B    1.3

DIR Delay LOS
EB  10.12  B
WB  16.23  C
NB  12.94  B
SB   5.18  B
INTERSECTION DELAY = 12.51 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  62.5 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  39.4 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
SUMMER/HIGH/SOUTH STREETS
NO BUILD CONDITIONS: PM PEAK HOUR
date:12-16-1988             time:16:34:53
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I1NBPM     GEOMETRICS=KBINT1     SIGNAL=KBINT1
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB  174  122  161     0  2  0     0.0 10.0  0.0    10
WB    0  318   82     0  2  1     0.0 12.0 11.0    33
NB   74  227    0     1  1  0    10.0 11.0  0.0    27
SB   16   72  149     0  1  1     0.0 12.0 12.0    38

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                PEDESTRIANS       ARR
DIR GRADE %HV    Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   Y     2   30   .930  150   Y    11.3    3
WB  0.0%  2.0%   N     0   10   .930  100   Y    11.3    3
NB  0.0%  2.0%   N     0   30   .930 1000   y    12.5    3
SB  0.0%  2.0%         0    0   .930  850   y    12.5    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *     *  *  *              *           *  32.6   4    A
 2           *           *  *  *  *     *  *  *      19.4   4    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB   174  122  161  .930   187  131  173
WB     0  318   82  .930     0  342   88
NB    74  227    0  .930    80  244    0
SB    16   72  149  .930    17   77  160

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N    LU     v  Plt  Prt
EB  LT-TH-RT   491 2 1.05  516 0.38 0.35
WB  TH         342 2 1.05  359 0.00 0.00
WB  RT          88 1 1.00   88 0.00 1.00
NB  LT          80 1 1.00   80 1.00 0.00
NB  TH         244 1 1.00  244 0.00 0.00
SB  LT-TH       95 1 1.00   95 0.18 0.00
SB  RT         160 1 1.00  160 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT  TH    RT        LT   TH   RT       LT  TH  RT    VOLUME
EASTBOUND         0  342   88       100  100    0        0   2   1     342
NORTHBOUND       17   77  160       100  100    0        0   1   1      77
SOUTHBOUND       80  244    0       100  100  100        1   1   0     244

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  LT-TH-RT  1800  2 0.933 0.990 1.000 0.945 0.938 0.900 0.779 0.842 1740
WB  TH        1800  2 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3208
WB  RT        1800  1 0.967 0.990 1.000 1.000 0.958 0.900 0.445 1.000  662
NB  LT        1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.865 1294
NB  TH        1800  1 0.967 0.990 1.000 1.000 0.875 0.900 1.000 1.000 1357
SB  LT-TH     1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.951 1525
SB  RT        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 0.779 1.000 1249

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
EB  60  33  2  491  491  187 0.38  2  342 0.00
NB  60  19  1   80  244   80 1.00  1   77 0.18
SB  60  19  1   95  238   17 0.18  1  244 0.00
CALCULATIONS
DIR Sop    Yo     Gu     Fs    Pl      Gq    Pt     Gf       El    Fm   Flt
EB 3600 0.095 29.751 0.661 0.895  2.873 0.105  0.226    1.701 0.683 0.842
NB 1634 0.047 17.356 0.827 1.000  2.020 0.000  0.000    1.361 0.865 0.865
SB 1800 0.136 13.003 0.722 0.182  6.373 0.818  4.252    1.557 0.951 0.951

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH-RT  516 1740 0.30 0.54  946 0.55     *
WB  TH        359 3208 0.11 0.54 1744 0.21
WB  RT         88  662 0.13 0.54  360 0.25
NB  LT         80 1294 0.06 0.32  418 0.19
NB  TH        244 1357 0.18 0.32  438 0.56     *
SB  LT-TH      95 1525 0.06 0.32  492 0.19
SB  RT        160 1249 0.13 0.32  403 0.40

CYCLE= 60.0  LOST= 8.0  SUM V/S CRIT= 0.48 TOTAL V/C= 0.55

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C      d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.55 0.54  60.0   6.75  946    0.52 0.85   6.17  B    3.7
WB  TH       0.21 0.54  60.0   5.34 1744    0.01 0.85   4.55  A    2.6
WB  RT       0.25 0.54  60.0   5.48  360    0.07 0.85   4.72  A    0.7
NB  LT       0.19 0.32  60.0  11.14  418    0.03 0.85   9.49  B    0.9
NB  TH       0.56 0.32  60.0  12.75  438    1.20 0.85  11.86  B    2.8
SB  LT-TH    0.19 0.32  60.0  11.14  492    0.02 0.85   9.49  B    1.1
SB  RT       0.40 0.32  60.0  11.99  403    0.35 0.85  10.49  B    1.8

DIR Delay LOS
EB   6.17  B
WB   4.58  A
NB  11.27  B
SB  10.12  B
INTERSECTION DELAY =  7.44 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  16.0 SECONDS
for chosen cycle length  60.0
suggested timing phase 1 is  32.4 secs green,   4.0 secs yellow + red clear
suggested timing phase 2 is  19.6 secs green,   4.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
SUMMER/HIGH/SOUTH STREETS
NO BUILD CONDITIONS: SAT PEAK HOUR
date:12-20-1988             time:19:20:19
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I1NBSAT    GEOMETRICS=KBINT1     SIGNAL=KBINT1
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT    TH    RT     LT TH RT      LT    TH    RT    WALK
EB   34    53    62     0  1  1     0.0 10.0 10.0    10
WB    0   276    56     0  2  1     0.0 12.0 11.0    33
NB   64    49     0     1  1  0    10.0 11.0  0.0    27
SB   10    40   196     0  1  1     0.0 12.0 12.0    38

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                   PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0    0 .910  200   Y    11.3    3
WB  0.0%  2.0%   N     0   10 .920  400   Y    11.3    3
NB  0.0%  2.0%   N     0   30 .920  750   y    12.5    3
SB  0.0%  2.0%         0    0 .920  500   y    12.5    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN   Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *     *  *  *              *           *  18.6   4    A
 2           *           *  *  *  *     *  *  *     33.4   4    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB    34   53   62  .910    37   58   68
WB     0  276   56  .920     0  300   61
NB    64   49    0  .920    70   53    0
SB    10   40  196  .920    11   43  213

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N    LU     v  Plt  Prt
EB  LT-TH       96 1 1.00    96 0.39 0.00
EB  RT          68 1 1.00    68 0.00 1.00
WB  TH         300 2 1.05   315 0.00 0.00
WB  RT          61 1 1.00    61 0.00 1.00
NB  LT          70 1 1.00    70 1.00 0.00
NB  TH          53 1 1.00    53 0.00 0.00
SB  LT-TH       54 1 1.00    54 0.20 0.00
SB  RT         213 1 1.00   213 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN   # LANES      OPPOSING
                 LT   TH   RT        LT   TH   RT        LT  TH  RT    VOLUME
EASTBOUND         0  300   61       100  100    0        0   2   1     300
NORTHBOUND       11   43  213       100  100    0        0   1   1      43
SOUTHBOUND       70   53    0       100  100  100        1   1   0      53

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  LT-TH     1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.890 1332
EB  RT        1800  1 0.933 0.990 1.000 1.000 1.000 0.900 0.493 1.000  738
WB  TH        1800  2 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3208
WB  RT        1800  1 0.967 0.990 1.000 1.000 0.958 0.900 0.612 1.000  909
NB  LT        1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.858 1284
NB  TH          1800  1 0.967 0.990 1.000 1.000 0.875 0.900 1.000 1.000 1357
SB  LT-TH       1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604
SB  RT          1800  1 1.000 0.990 1.000 1.000 1.000 0.900 0.755 1.000 1211

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N    Va   Vm  Vlt  Plt No   Vo Plto
EB  60  19  1    96  126   37 0.39  2  300 0.00
NB  60  33  1    70   53   70 1.00  1   43 0.20
SB  60  33  1    54  257   11 0.20  1   53 0.00
CALCULATIONS
DIR Sop    Yo     Gu     Fs     Pl      Gq     Pt     Gf        El    Fm   Flt
EB 3600 0.083 14.862 0.688 0.391  3.761 0.609  1.890     1.636 0.890 0.890
NB 1686 0.026 32.672 0.848 1.000  0.705 0.000  0.000     1.327 0.858 0.858
SB 1800 0.030 32.565 0.842 0.200  0.812 0.800  0.693     1.337 1.000 1.000

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH       96 1332 0.07 0.31  414 0.23
EB  RT          68  738 0.09 0.31  229 0.30
WB  TH         315 3208 0.10 0.31  996 0.32      *
WB  RT          61  909 0.07 0.31  282 0.22
NB  LT          70 1284 0.05 0.56  714 0.10
NB  TH          53 1357 0.04 0.56  755 0.07
SB  LT-TH       54 1604 0.03 0.56  892 0.06
SB  RT         213 1211 0.18 0.56  673 0.32      *

CYCLE= 60.0  LOST= 8.0  SUM V/S CRIT= 0.27 TOTAL V/C= 0.32

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1     c       d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH     0.23 0.31  60.0  11.68  414     0.05 0.85   9.97  B   1.1     1
EB  RT        0.30 0.31  60.0  11.95  229     0.22 0.85  10.34  B   0.8     1
WB  TH        0.32 0.31  60.0  12.02  996     0.06 0.85  10.27  B   3.4     3
WB  RT        0.22 0.31  60.0  11.62  282     0.06 0.85   9.93  B   0.7     1
NB  LT        0.10 0.56  60.0   4.75  714     0.00 0.85   4.04  A   0.5     1
NB  TH        0.07 0.56  60.0   4.67  755     0.00 0.85   3.97  A   0.4     1
SB  LT-TH     0.06 0.56  60.0   4.65  892     0.00 0.85   3.95  A   0.4     1
SB  RT        0.32 0.56  60.0   5.45  673     0.09 0.85   4.71  A   1.6     2

DIR Delay LOS
EB  10.13  B
WB  10.22  B
NB   4.01  A
SB   4.56  A
INTERSECTION DELAY =  7.75 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  11.2 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
SUMMER/LINCOLN/BEDFORD
NO BUILD CONDITIONS: AM PEAK HOUR
date:12-16-1988            time:11:06:18
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2NBAM     GEOMETRICS=KBINT2     SIGNAL=KBINT2
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES       # OF LANES      LANE WIDTH      CROSS
DIR  LT   TH    RT    LT TH RT      LT   TH   RT     WALK
EB    0  105     3     0  1  1     0.0 10.0  9.0     36
WB  358  275     0     1  1  0    13.0 13.0  0.0     33
NB  358  353   125     1  1  1    10.0 10.0 10.0     27
SB    0    0     0     0  0  0     0.0  0.0  0.0      0

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                PEDESTRIANS      ARR
DIR GRADE %HV    Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%    N      0     0  .910  450   N     14.0    3
WB  0.0%  2.0%    N      0    21  .910 1000   N     14.0    3
NB  0.0%  2.0%    N      0     0  .910  850   N     11.8    3
SB  0.0%  0.0%           0     0  .000    0         11.8    0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1           *           *  *  *  *                 24.7   2    A
 2     *  *        *                 *           *   6.9   2    A
 3              *  *                             *  22.4   2    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR   LTV  THV  RTV    PHF  LTFR THFR RTFR
EB      0  105    3   .910     0  115    3
WB    358  275    0   .910   393  302    0
NB    358  353  125   .910   393  388  137
SB      0    0    0   .000     0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N    LU     v  Plt  Prt
EB  TH          115 1 1.00   115 0.00 0.00
EB  RT            3 1 1.00     3 0.00 1.00
WB  LT          393 1 1.00   393 1.00 0.00
WB  TH          302 1 1.00   302 0.00 0.00
NB  LT          393 1 1.00   393 1.00 0.00
NB  TH          388 1 1.00   388 0.00 0.00
NB  RT          137 1 1.00   137 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                  OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN     # LANES      OPPOSIN
                  LT   TH   RT       LT   TH   RT      LT  TH  RT      VOLUME
WESTBOUND          0  115    3        0    0    0       0   1   1         0
NORTHBOUND         0    0    0        0    0    0       0   0   0         0

SATURATION FLOW ADJUSTMENT WORKSHEET
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DIR LN GROUP   IDEAL N  Fwid    Fhv    Fgr Fpark  Fbus Farea   Frt   Flt     s
EB  TH         1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
EB  RT         1800  1 0.900 0.990 1.000 1.000 1.000 0.900 0.445 1.000  643
WB  LT         1800  1 1.033 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1575
WB  TH         1800  1 1.033 0.990 1.000 1.000 0.913 0.900 1.000 1.000 1512
NB  LT         1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1422
NB  TH         1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
NB  RT         1800  1 0.933 0.990 1.000 1.000 1.000 0.900 0.374 1.000  560

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v     s  v/s  g/C     c  v/c  CRITICAL
EB  TH         115  1497 0.08 0.11   172 0.67      *
EB  RT           3   643 0.01 0.11    74 0.04
WB  LT         393  1575 0.25 0.37   587 0.67      *
WB  TH         302  1512 0.20 0.52   788 0.38
NB  LT         393  1422 0.28 0.41   587 0.67      *
NB  TH         388  1497 0.26 0.41   618 0.63
NB  RT         137   560 0.25 0.41   231 0.60

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.60 TOTAL V/C= 0.67

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C      d1    c      d2   PF    Delay LOS Avg Q  95% Q
EB  TH       0.67 0.11  60.0  19.35  172    6.53 0.85   22.00  C    1.7
EB  RT       0.04 0.11  60.0  17.95   74    0.00 0.85   15.26  C    0.0
WB  LT       0.67 0.37  60.0  11.97  587    2.08 1.00   14.04  B    4.1
WB  TH       0.38 0.52  60.0   6.54  788    0.16 0.85    5.70  B    2.4
NB  LT       0.67 0.41  60.0  10.88  587    2.08 1.00   12.96  B    3.9
NB  TH       0.63 0.41  60.0  10.62  618    1.45 0.85   10.26  B    3.8
NB  RT       0.60 0.41  60.0  10.43  231    2.95 0.85   11.37  B    1.3

DIR Delay LOS
EB  21.81  C
WB  10.42  B
NB  11.58  B
INTERSECTION DELAY = 11.81 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  16.5 SECONDS
THE EXISTING TIMING IS OPTIMAL
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NoBuild

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
SUMMER/LINCOLN/BEDFORD
~~EXISTING~~ CONDITIONS: PM PEAK HOUR
date:12-16-1988              time:16:42:56
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=KBINT2PM   GEOMETRICS=KBIN2      SIGNAL=KBINT2
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES       # OF LANES     LANE WIDTH     CROSS
DIR   LT    TH    RT    LT TH RT      LT   TH   RT    WALK
EB     0   200     5     0  1  1     0.0 10.0  9.0    36
WB   340   200     0     1  1  0    13.0 13.0  0.0    33
NB   131   245   259     1  1  1    10.0 10.0 10.0    27
SB     0     0     0     0  0  0     0.0  0.0  0.0     0

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK              PEDESTRIANS      ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0     0  .920  450   N    14.0    3
WB  0.0%  2.0%   N     0    21  .920 1000   N    14.0    3
NB  0.0%  2.0%   N     0     0  .920  850   N    11.8    3
SB  0.0%  0.0%         0     0  .000    0        11.8    0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1           *           *  *  *  *                 38.2    2    A
 2     *  *        *                 *           *  11.0    2    A
 3              *  *                             *  17.8    2    A

CYCLE=  73.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR   LTV  THV  RTV   PHF  LTFR THFR RTFR
EB      0  200    5  .920     0  217    5
WB    340  200    0  .920   370  217    0
NB    131 ·245  259  .920   142  266  282
SB      0    0    0  .000     0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
EB  TH         217 1 1.00  217 0.00 0.00
EB  RT           5 1 1.00    5 0.00 1.00
WB  LT         370 1 1.00  370 1.00 0.00
WB  TH         217 1 1.00  217 0.00 0.00
NB  LT         142 1 1.00  142 1.00 0.00
NB  TH         266 1 1.00  266 0.00 0.00
NB  RT         282 1 1.00  282 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES       % OPPOSING LEFT TURN     # LANES     OPPOSING
                  LT   TH   RT      LT    TH    RT        LT  TH  RT    VOLUME
WESTBOUND          0  217    5       0     0     0         0   1   1       0
NORTHBOUND         0    0    0       0     0     0         0   0   0       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP IDEAL N  Fwid   Fhv   Fgr  Fpark  Fbus Farea   Frt   Flt     s
EB  TH       1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
EB  RT       1800  1 0.900 0.990 1.000 1.000 1.000 0.900 0.445 1.000  643
WB  LT       1800  1 1.033 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1575
WB  TH       1800  1 1.033 0.990 1.000 1.000 0.913 0.900 1.000 1.000 1512
NB  LT       1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1422
NB  TH       1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
NB  RT         1800  1 0.933 0.990 1.000 1.000 1.000 0.900 0.374 1.000  560

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v     s  v/s  g/C     c  v/c  CRITICAL
EB  TH         217 1497 0.15 0.15   226 0.96     *
EB  RT           5  643 0.01 0.15    97 0.06
WB  LT         370 1575 0.23 0.24   384 0.96     *
WB  TH         217 1512 0.14 0.42   639 0.34
NB  LT         142 1422 0.10 0.52   744 0.19
NB  TH         266 1497 0.18 0.52   783 0.34
NB  RT         282  560 0.50 0.52   293 0.96     *

CYCLE= 73.0  LOST= 6.0  SUM V/S CRIT= 0.88 TOTAL V/C= 0.96

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1     c     d2   PF   Delay LOS Avg Q  95% Q
EB  TH        0.96 0.15  73.0  23.40  226   36.16 0.85   50.62  E    4.9
EB  RT        0.06 0.15  73.0  20.17   97    0.00 0.85   17.15  C    0.1
WB  LT        0.96 0.24  73.0  20.72  384   26.55 1.00   47.27  E    7.7
WB  TH        0.34 0.42  73.0  10.81  639    0.13 0.85    9.30  B    2.5
NB  LT        0.19 0.52  73.0   7.02  744    0.02 1.00    7.03  B    1.4
NB  TH        0.34 0.52  73.0   7.68  783    0.11 0.85    6.62  B    2.6
NB  RT        0.96 0.52  73.0  12.71  293   31.15 0.85   37.28  D    4.3

DIR Delay LOS
EB  49.81  E
WB  33.21  D
NB  19.21  C
INTERSECTION DELAY = 29.23 INTERSECTION LOS=D

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  73.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  85.1 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
SUMMER/LINCOLN/BEDFORD
NO BUILD CONDITIONS: SAT PEAK HOUR
date:12-20-1988              time:19:26:22
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2NBSAT    GEOMETRICS=KBINT2     SIGNAL=KBINT2
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES        # OF LANES      LANE WIDTH      CROSS
DIR  LT   TH    RT     LT TH RT      LT   TH    RT     WALK
EB    0  105     5      0  1  1     0.0 10.0  9.0      36
WB  255  282     0      1  1  0    13.0 13.0  0.0      33
NB   33  176   184      1  1  1    10.0 10.0 10.0      27
SB    0    0     0      0  0  0     0.0  0.0  0.0       0

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                PEDESTRIANS       ARR
DIR GRADE %HV    Y/N MOVES BUSES   PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%    N      0     0  .910  450   N     14.0    3
WB  0.0%  2.0%    N      0    21  .910  500   N     14.0    3
NB  0.0%  2.0%    N      0     0  .910  500   N     11.8    3
SB  0.0%  0.0%           0     0  .000    0         11.8    0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1           *           *  *  *  *                 25.1   2    A
 2     *  *        *                 *           *   8.7   2    A
 3              *  *                             *  20.2   2    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR   LTV   THV  RTV    PHF   LTFR THFR RTFR
EB      0   105    5  .910      0  115    5
WB    255   282    0  .910    280  310    0
NB     33   176  184  .910     36  193  202
SB      0     0    0  .000      0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N    LU     v  Plt  Prt
EB  TH          115 1 1.00   115 0.00 0.00
EB  RT            5 1 1.00     5 0.00 1.00
WB  LT          280 1 1.00   280 1.00 0.00
WB  TH          310 1 1.00   310 0.00 0.00
NB  LT           36 1 1.00    36 1.00 0.00
NB  TH          193 1 1.00   193 0.00 0.00
NB  RT          202 1 1.00   202 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                 OPPOSING APPROACH
BEING OPPOSED          VOLUMES       % OPPOSING LEFT TURN       # LANES      OPPOSING
                    LT    TH    RT         LT    TH    RT        LT  TH  RT     VOLUME
WESTBOUND            0   115     5          0     0     0         0   1   1          0
NORTHBOUND           0     0     0          0     0     0         0   0   0          0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP   IDEAL N  Fwid   Fhv    Fgr  Fpark  Fbus  Farea   Frt    Flt     s
EB  TH          1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
EB  RT          1800  1 0.900 0.990 1.000 1.000 1.000 0.900 0.612 1.000  883
WB  LT          1800  1 1.033 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1575
WB  TH          1800  1 1.033 0.990 1.000 1.000 0.913 0.900 1.000 1.000 1512
NB  LT          1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1422
NB  TH          1800   1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
NB  RT          1800   1 0.933 0.990 1.000 1.000 1.000 0.900 0.612 1.000  916

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP      v     s  v/s  g/C     c  v/c  CRITICAL
EB  TH          115 1497 0.08 0.15   218 0.53     *
EB  RT            5  883 0.01 0.15   129 0.04
WB  LT          280 1575 0.18 0.34   530 0.53     *
WB  TH          310 1512 0.20 0.52   780 0.40
NB  LT           36 1422 0.03 0.42   594 0.06
NB  TH          193 1497 0.13 0.42   625 0.31
NB  RT          202  916 0.22 0.42   382 0.53     *

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.48 TOTAL V/C= 0.53

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C      d1     c       d2   PF    Delay LOS Avg Q  95% Q
EB  TH       0.53 0.15  60.0  18.03   218     1.91 0.85   16.94  C    1.6      2
EB  RT       0.04 0.15  60.0  16.74   129     0.00 0.85   14.23  B    0.1      1
WB  LT       0.53 0.34  60.0  12.20   530     0.80 1.00   13.01  B    3.1      4
WB  TH       0.40 0.52  60.0   6.72   780     0.18 0.85    5.87  B    2.5      3
NB  LT       0.06 0.42  60.0   7.94   594     0.00 1.00    7.94  B    0.4      1
NB  TH       0.31 0.42  60.0   8.88   625     0.09 0.85    7.63  B    1.9      2
NB  RT       0.53 0.42  60.0   9.93   382     1.11 0.85    9.38  B    2.0      2

DIR Delay LOS
EB  16.82  C
WB   9.26  B
NB   8.47  B
INTERSECTION DELAY =  9.76 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  12.0 SECONDS
THE EXISTING TIMING IS OPTIMAL
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 ì_û  PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
OTIS/KINGSTON/SUMMER STREETS
NO BUILD CONDITIONS: AM PEAK HOUR
date:12-16-1988             time:11:15:59
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=i3nbam     GEOMETRICS=kbint3     SIGNAL=kbint3
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB    0    50   52     0  1  1     0.0 12.0 12.0    25
WB   86    0    0     1  0  0    12.0  0.0  0.0    32
NB    0    0    0     0  0  0     0.0  0.0  0.0     0
SB   56  179    0     1  1  0    12.0 12.0  0.0    25

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS      ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   Y     10    0   .880  400   N    11.0    3
WB  0.0%  2.0%   N      0    0   .880  400   N    11.0    3
NB  0.0%  0.0%          0    0   .880    0         9.3    3
SB  0.0%  2.0%   N      0    0   .880  400   N     9.3    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1     *  *     *                    *           *  18.0    4    A
 2           *           *              *  *        34.0    4    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0   50   52  .880     0   57   59
WB    86    0    0  .880    98    0    0
NB     0    0    0  .880     0    0    0
SB    56  179    0  .880    64  203    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU     v  Plt  Prt
EB  TH          57 1 1.00   57 0.00 0.00
EB  RT          59 1 1.00   59 0.00 1.00
WB  LT          98 1 1.00   98 1.00 0.00
SB  LT          64 1 1.00   64 1.00 0.00
SB  TH         203 1 1.00  203 0.00 0.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT    VOLUME
WESTBOUND         0   57   59       100  100    0        0   1   1      57
SOUTHBOUND        0    0    0         0    0    0        0   0   0       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  TH        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604
EB  RT        1800  1 1.000 0.990 1.000 0.849 1.000 0.900 0.850 1.000 1157
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WB  LT        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.912 1463
SB  LT        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
SB  TH        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
WB  60  18  1   98     0   98 1.00  1   57 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
WB 1800 0.032 16.594 0.839 1.000  1.370 0.000  0.000    1.340 0.912 0.912

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  TH         57 1604 0.04 0.30  480 0.12
EB  RT         59 1157 0.05 0.30  347 0.17
WB  LT         98 1463 0.07 0.30  438 0.22     *
SB  LT         64 1524 0.04 0.57  864 0.07
SB  TH        203 1604 0.13 0.57  910 0.22     *

CYCLE= 60.0  LOST= 8.0  SUM V/S CRIT= 0.19 TOTAL V/C= 0.22

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH       0.12 0.30  60.0  11.60  480    0.01 0.85    9.87  B   0.7
EB  RT       0.17 0.30  60.0  11.79  347    0.02 0.85   10.04  B   0.7
WB  LT       0.22 0.30  60.0  11.99  438    0.05 0.85   10.23  B   1.1
SB  LT       0.07 0.57  60.0   4.46  864    0.00 1.00    4.46  A   0.5
SB  TH       0.22 0.57  60.0   4.89  910    0.02 0.85    4.17  A   1.5

DIR Delay LOS
EB   9.96   B
WB  10.23   B
SB   4.24   A
INTERSECTION DELAY =  6.84 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  10.0 SECONDS
for chosen cycle length  60.0
suggested timing phase 1 is  17.9 secs green,   4.0 secs yellow + red clear
suggested timing phase 2 is  34.1 secs green,   4.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
OTIS/KINGSTON/SUMMER STREETS
NO BUILD CONDITIONS: PM PEAK HOUR
date:12-16-1988              time:16:48:12
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=KBI3PM     GEOMETRICS=KBIN3        SIGNAL=KBINT3
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES        # OF LANES      LANE WIDTH      CROSS
DIR  LT   TH    RT     LT TH RT      LT    TH    RT    WALK
EB    0  115    84      0  1  1     0.0  12.0  12.0     25
WB   92    0     0      1  0  0    12.0   0.0   0.0     32
NB    0    0     0      0  0  0     0.0   0.0   0.0      0
SB   89  324     0      1  1  0    12.0  12.0   0.0     25

TRAFFIC & ROADWAY CONDITIONS
                  ADJ PARK                 PEDESTRIANS       ARR
DIR GRADE %HV    Y/N MOVES  BUSES  PHF  CROSS  BUT MIN TIME  TYPE
EB  0.0%  2.0%    Y    10     0   .980   400    N     11.0     3
WB  0.0%  2.0%    N     0     0   .980   400    N     11.0     3
NB  0.0%  0.0%          0     0   .980     0           9.3     3
SB  0.0%  2.0%    N     0     0   .980   400    N      9.3     3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND   SOUTHBOUND GREEN   Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1     *  *     *                    *           *  13.7    4     A
 2           *           *              *  *        38.3    4     A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF   LTFR THFR RTFR
EB     0  115   84  .980     0   117   86
WB    92    0    0  .980    94     0    0
NB     0    0    0  .980     0     0    0
SB    89  324    0  .980    91   331    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N    LU     v   Plt  Prt
EB  TH          117 1 1.00   117 0.00 0.00
EB  RT           86 1 1.00    86 0.00 1.00
WB  LT           94 1 1.00    94 1.00 0.00
SB  LT           91 1 1.00    91 1.00 0.00
SB  TH          331 1 1.00   331 0.00 0.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                   OPPOSING APPROACH
BEING OPPOSED         VOLUMES        % OPPOSING LEFT TURN      # LANES      OPPOSING
                   LT    TH    RT        LT    TH    RT       LT   TH   RT     VOLUME
WESTBOUND           0   117    86       100   100     0        0    1    1       117
SOUTHBOUND          0     0     0         0     0     0        0    0    0         0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP   IDEAL N  Fwid    Fhv    Fgr  Fpark  Fbus  Farea   Frt    Flt     s
EB  TH         1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604
EB  RT         1800  1 1.000 0.990 1.000 0.849 1.000 0.900 0.850 1.000 1157
WB  LT         1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.836 1342
SB  LT         1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
SB  TH         1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C    G  N    Va    Vm   Vlt   Plt No    Vo Plto
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WB  60  14  1   94    0   94 1.00  1  117 0.00
CALCULATIONS
DIR Sop    Yo     Gu     Fs     Pl      Gq     Pt     Gf        El     Fm    Flt
WB 1800 0.065 10.518 0.802 1.000  3.226 0.000  0.000     1.403 0.836 0.836

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v     s  v/s  g/C     c  v/c  CRITICAL
EB  TH         117 1604 0.07 0.23   367 0.32
EB  RT          86 1157 0.07 0.23   265 0.32      *
WB  LT          94 1342 0.07 0.23   307 0.31
SB  LT          91 1524 0.06 0.64   972 0.09
SB  TH         331 1604 0.21 0.64  1023 0.32      *

CYCLE= 60.0  LOST= 8.0  SUM V/S CRIT= 0.28 TOTAL V/C= 0.32

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1     c       d2   PF   Delay LOS Avg Q  95% Q
EB  TH        0.32 0.23  60.0  14.62  367     0.18 0.85   12.58  B   1.5
EB  RT        0.32 0.23  60.0  14.63  265     0.26 0.85   12.66  B   1.1
WB  LT        0.31 0.23  60.0  14.57  307     0.18 0.85   12.54  B   1.2
SB  LT        0.09 0.64  60.0   3.18  972     0.00 1.00    3.19  A   0.5
SB  TH        0.32 0.64  60.0   3.77 1023     0.07 0.85    3.26  A   2.0

DIR Delay LOS
EB  12.61  B
WB  12.54  B
SB   3.25  A
INTERSECTION DELAY =  7.11 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  11.3 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
OTIS/KINGSTON/SUMMER STREETS
NO BUILD CONDITIONS: SAT PEAK HOUR
date:12-20-1988             time:19:34:06
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I3NBSAT    GEOMETRICS=KBINT3      SIGNAL=KBINT3
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES         # OF LANES      LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB    0   73   86     0  1  1     0.0 12.0 12.0    25
WB  151    0    0     1  0  0    12.0  0.0  0.0    32
NB    0    0    0     0  0  0     0.0  0.0  0.0     0
SB   38  189    0     1  1  0    12.0 12.0  0.0    25

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N    10    0   .880  400   N    11.0    3
WB  0.0%  2.0%   N     0    0   .880  400   N    11.0    3
NB  0.0%  0.0%         0    0   .000  500         9.3    3
SB  0.0%  2.0%   N     0    0   .880  400   N     9.3    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1     *  *     *                    *           *  25.1   4    A
 2           *           *              *  *        26.9   4    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0   73   86  .880     0   83   98
WB   151    0    0  .880   172    0    0
NB     0    0    0  .000     0    0    0
SB    38  189    0  .880    43  215    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
EB  TH          83 1 1.00   83 0.00 0.00
EB  RT          98 1 1.00   98 0.00 1.00
WB  LT         172 1 1.00  172 1.00 0.00
SB  LT          43 1 1.00   43 1.00 0.00
SB  TH         215 1 1.00  215 0.00 0.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT    VOLUME
WESTBOUND         0   83   98       100  100    0        0   1   1      83
SOUTHBOUND        0    0    0         0    0    0        0   0   0       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  TH        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604
EB  RT        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 0.612 1.000  981
WB  LT        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.842 1350
SB  LT        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
SB  TH        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
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DIR  C   G  N   Va    Vm  Vlt  Plt No    Vo Plto
WB  60  25  1  172     0  172 1.00  1    83 0.00
CALCULATIONS
DIR Sop    Yo      Gu     Fs     Pl      Gq     Pt     Gf         El    Fm   Flt
WB 1800 0.046 23.423 0.823 1.000  1.686 0.000  0.000    1.367 0.842 0.842

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP       v    s  v/s  g/C     c  v/c  CRITICAL
EB  TH            83 1604 0.05 0.42   671 0.12
EB  RT            98  981 0.10 0.42   411 0.24
WB  LT           172 1350 0.13 0.42   565 0.30     *
SB  LT            43 1524 0.03 0.45   683 0.06
SB  TH           215 1604 0.13 0.45   719 0.30     *

CYCLE= 60.0  LOST= 8.0  SUM V/S CRIT= 0.26 TOTAL V/C= 0.30

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C      d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH       0.12 0.42  60.0   8.13  671    0.00 0.85    6.92  B   0.8     1
EB  RT       0.24 0.42  60.0   8.56  411    0.06 0.85    7.33  B   0.9     1
WB  LT       0.30 0.42  60.0   8.83  565    0.10 0.85    7.59  B   1.7     2
SB  LT       0.06 0.45  60.0   7.14  683    0.00 1.00    7.15  B   0.4     1
SB  TH       0.30 0.45  60.0   8.02  719    0.07 0.85    6.88  B   2.0     2

DIR Delay LOS
EB   7.14  B
WB   7.59  B
SB   6.92  B
INTERSECTION DELAY =  7.17 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  11.0 SECONDS
for chosen cycle length  60.0
suggested timing phase 1 is  25.3 secs green,   4.0 secs yellow + red clear
suggested timing phase 2 is  26.7 secs green,   4.0 secs yellow + red clear
```

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 1 of 2)
DATE:12-16-1988             TIME:11:30:06
BEDFORD/COLUMBIA NO BUILD CONDITIONS: AM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=I4NBAM     GEOMETRICS=kbint4
KEY: A-  -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: N

MINOR STREET LANES
APPROACH: C: COLUMBIA NB
SHARED LEFT AND RIGHT TURN LANE: YES
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO


SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: BEDFORD EB  B: BEDFORD WB  C: COLUMBIA NB
LEFTS             0.00           0.00           0.00
THRUS             0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00


APPROACH        A: BEDFORD EB  B: BEDFORD WB  C: COLUMBIA NB
                 LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0    0    1    0  720    0   11    0    0
PHF               0.77           0.77           0.77
ADJ VOLUME        0    0    1    0  935    0   14    0    0
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR       0              0             16    0    0


STEP 1 RIGHT TURNS FROM     C:COLUMBIA NB
CONFLICTING FLOWS                         1
CRITICAL GAPS                           5.0
CAPACITY                               1199
ACTUAL CAPACITY                        1199


STEP 2 LEFT TURNS FROM     B:BEDFORD WB
CONFLICTING FLOWS                         1
CRITICAL GAPS                           4.5
CAPACITY                               1308
CAPACITY USED                             0%
IMPEDANCE FACTOR                       1.00
ACTUAL CAPACITY                        1308
```

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1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 2 of 2)
DATE:12-16-1988             TIME:11:30:06
BEDFORD/COLUMBIA NO BUILD CONDITIONS: AM PEAK HOUR


STEP 3 LEFT TURNS FROM     C:COLUMBIA NB
CONFLICTING FLOWS                       936
CRITICAL GAPS                           6.0
CAPACITY                                300
ACTUAL CAPACITY                         300


                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT               DEMAND     CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUEU


ALL MOVES FROM C:         16         300       285     C     12.64          0.06
```

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 1 of 2)
DATE:12-16-1988  No Build     TIME:16:50:20
BEDFORD/COLUMBIA ~~EXISTING~~ CONDITIONS: PM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=KBI4PM      GEOMETRICS=KBINT4
KEY: A-  -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: N

MINOR STREET LANES
APPROACH: C: COLUMBIA NB
SHARED LEFT AND RIGHT TURN LANE: YES
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO


SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH         A: BEDFORD EB  B: BEDFORD WB  C: COLUMBIA NB
LEFTS              0.00           0.00           0.00
THRUS              0.00           0.00           0.00
RIGHTS             0.00           0.00           0.00


APPROACH         A: BEDFORD EB  B: BEDFORD WB  C: COLUMBIA NB
                  LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0    0    1    0  477    0   23    0    0
PHF               0.94           0.94           0.94
ADJ VOLUME        0    0    1    0  507    0   24    0    0
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR       0              0             27    0    0


STEP 1 RIGHT TURNS FROM      C:COLUMBIA NB
CONFLICTING FLOWS                        1
CRITICAL GAPS                          5.0
CAPACITY                              1199
ACTUAL CAPACITY                       1199


STEP 2 LEFT TURNS FROM      B:BEDFORD WB
CONFLICTING FLOWS                        1
CRITICAL GAPS                          4.5
CAPACITY                              1308
CAPACITY USED                           0%
IMPEDANCE FACTOR                      1.00
ACTUAL CAPACITY                       1308
```

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1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 2 of 2)
DATE:12-16-1988              TIME:16:50:20
BEDFORD/COLUMBIA EXISTING CONDITIONS: PM PEAK HOUR


STEP 3 LEFT TURNS FROM     C:COLUMBIA NB
CONFLICTING FLOWS                      508
CRITICAL GAPS                          6.0
CAPACITY                               545
ACTUAL CAPACITY                        545


                      SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT                 DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUE


ALL MOVES FROM C:          27         545       518     A       6.95          0.05
```

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 1 of 2)
DATE:12-20-1988             TIME:20:33:44
BEDFORD/COLUMBIA NO BUILD CONDITIONS: SAT PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=I4NBSAT    GEOMETRICS=KBINT4
KEY: A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: N

MINOR STREET LANES
APPROACH: C: COLUMBIA NB
SHARED LEFT AND RIGHT TURN LANE: YES
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO


SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: BEDFORD EB  B: BEDFORD WB  C: COLUMBIA NB
LEFTS             0.00           0.00           0.00
THRUS             0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00


APPROACH        A: BEDFORD EB  B: BEDFORD WB  C: COLUMBIA NB
                 LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0    0    1    0  444    0   22    0    0
PHF               0.77           0.77           0.77
ADJ VOLUME        0    0    1    0  577    0   29    0    0
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR       0              0             31    0    0


STEP 1 RIGHT TURNS FROM     C:COLUMBIA NB
CONFLICTING FLOWS                        1
CRITICAL GAPS                          5.0
CAPACITY                              1199
ACTUAL CAPACITY                       1199


STEP 2 LEFT TURNS FROM     B:BEDFORD WB
CONFLICTING FLOWS                        1
CRITICAL GAPS                          4.5
CAPACITY                              1308
CAPACITY USED                            0%
IMPEDANCE FACTOR                      1.00
ACTUAL CAPACITY                       1308
```

```
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:01-08-1989              TIME:10:57:23
KINGSTON/BEDFORD NO BUILD CONDITIONS: AM PEAK HOUR

STEP 2 LEFT TURNS FROM      B:BEDFORD WB                A:BEDFORD EB
CONFLICTING FLOWS                       128                      583
CRITICAL GAPS                           4.5                      4.5
CAPACITY                               1169                      756
CAPACITY USED                            8%                       0%
IMPEDANCE FACTOR                       0.95                     1.00
ACTUAL CAPACITY                        1169                      756

STEP 3 THRU MOVES FROM      C:KINGSTON NB               D:KINGSTON SB
CONFLICTING FLOWS                       735                      799
CRITICAL GAPS                           5.0                      5.5
CAPACITY                                547                      429
CAPACITY USED                            0%                      51%
IMPEDANCE FACTOR                       1.00                     0.56
ACTUAL CAPACITY                         521                      409

STEP 4 LEFT TURNS FROM      C:KINGSTON NB               D:KINGSTON SB
CONFLICTING FLOWS                      1051                      800
CRITICAL GAPS                           5.5                      6.0
CAPACITY                                306                      365
ACTUAL CAPACITY                         149                      347

                     SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT                DEMAND    CAPACITY  RESERVE    LOS  AVG DEL(SEC) AVG QUEU

LT FROM B:                 96       1169      1072      A      3.36          0.09

ALL MOVES FROM C:           1       1237      1236      A      2.91          0.00

ALL MOVES FROM D:         348        510       163      D     22.10          2.13
```

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:01-08-1989                  TIME:11:07:45
KINGSTON/BEDFORD NO BUILD CONDITIONS: ~~PM~~ PEAK HOUR
                                      SAT

LAST DATASETS LOADED OR SAVED
VOLUME=I5NBPM     GEOMETRICS=KBINT5
KEY:    D
        |
    A-  -B
        |
        C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: YIELD
          FROM D: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: KINGSTON NB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: KINGSTON SB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: BEDFORD EB  B: BEDFORD WB  C: KINGSTON NB D: KINGSTON SB
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: BEDFORD EB  B: BEDFORD WB  C: KINGSTON NB D: KINGSTON SB
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0    0  209  100  338    0    0    0    1    0  232  195
PHF               0.92           0.92           0.92           0.92
ADJ VOLUME        0    0  227  109  367    0    0    0    1    0  252  212
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR       0             120             0    0    1    0  277  233

STEP 1 RIGHT TURNS FROM      C:KINGSTON NB            D:KINGSTON SB
CONFLICTING FLOWS                      114                      184
CRITICAL GAPS                          4.5                      5.0
CAPACITY                              1184                      999
CAPACITY USED                           0%                      23%
IMPEDANCE FACTOR                      1.00                     0.83
ACTUAL CAPACITY                       1184                      999
```

```
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:01-08-1989            TIME:11:07:45
KINGSTON/BEDFORD NO BUILD CONDITIONS: PM PEAK HOUR

STEP 2 LEFT TURNS FROM     B:BEDFORD WB              A:BEDFORD EB
CONFLICTING FLOWS                      227                   367
CRITICAL GAPS                          4.5                   4.5
CAPACITY                              1068                   936
CAPACITY USED                          11%                    0%
IMPEDANCE FACTOR                      0.93                  1.00
ACTUAL CAPACITY                       1068                   936


STEP 3 THRU MOVES FROM     C:KINGSTON NB             D:KINGSTON SB
CONFLICTING FLOWS                      590                   703
CRITICAL GAPS                          5.0                   5.5
CAPACITY                               646                   486
CAPACITY USED                           0%                   57%
IMPEDANCE FACTOR                      1.00                  0.50
ACTUAL CAPACITY                        601                   452


STEP 4 LEFT TURNS FROM     C:KINGSTON NB             D:KINGSTON SB
CONFLICTING FLOWS                     1054                   704
CRITICAL GAPS                          5.5                   6.0
CAPACITY                               305                   417
ACTUAL CAPACITY                        118                   388


                     SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT                DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUE

LT FROM B:                120       1068       948     A       3.80          0.13

ALL MOVES FROM C:           1       1184      1183     A       3.04          0.00

ALL MOVES FROM D:         511        603        92     E      39.13          5.55
```

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:12-16-1988                TIME:11:41:53
BEDFORD/CHAUNCY/LP GARAGE NO BUILD CONDITIONS: AM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=I6NBAM     GEOMETRICS=KBINT6
KEY:   D
       |
     A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
          FROM D: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: YES
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: LP GARAGE EXIT
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: BEDFORD ST WB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: CHAUNCY ST  B: CHAUNCY ST  C: LP GARAGE E D: BEDFORD ST
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: CHAUNCY ST  B: CHAUNCY ST  C: LP GARAGE E D: BEDFORD ST
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME          103  142   68    0    1    0   12   45   13  318  229   57
PHF               0.92           0.92           0.92           0.92
ADJ VOLUME      112  154   74    0    1    0   13   49   14  346  249   62
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR     123              0             14   54   16  380  274   68

STEP 1 RIGHT TURNS FROM     C:LP GARAGE EXIT         D:BEDFORD ST WB
CONFLICTING FLOWS                       77                     1
CRITICAL GAPS                          5.0                   5.0
CAPACITY                              1112                  1199
CAPACITY USED                            1%                    6%
IMPEDANCE FACTOR                      0.99                  0.97
ACTUAL CAPACITY                       1112                  1199
```

```
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:12-16-1988             TIME:11:41:53
BEDFORD/CHAUNCY/LP GARAGE NO BUILD CONDITIONS: AM PEAK HOUR

STEP 2 LEFT TURNS FROM      B:CHAUNCY ST SB          A:CHAUNCY ST NB
CONFLICTING FLOWS                       154                        1
CRITICAL GAPS                           4.5                      4.5
CAPACITY                               1142                     1308
CAPACITY USED                            0%                       9%
IMPEDANCE FACTOR                       1.00                     0.94
ACTUAL CAPACITY                        1142                     1308

STEP 3 THRU MOVES FROM      C:LP GARAGE EXIT         D:BEDFORD ST WB
CONFLICTING FLOWS                       267                      267
CRITICAL GAPS                           5.5                      5.5
CAPACITY                                823                      823
CAPACITY USED                            7%                      33%
IMPEDANCE FACTOR                       0.96                     0.74
ACTUAL CAPACITY                         776                      776

STEP 4 LEFT TURNS FROM      C:LP GARAGE EXIT         D:BEDFORD ST WB
CONFLICTING FLOWS                       578                      330
CRITICAL GAPS                           6.0                      6.0
CAPACITY                                496                      686
ACTUAL CAPACITY                         336                      620

                     SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT                DEMAND    CAPACITY  RESERVE    LOS  AVG DEL(SEC) AVG QUEUE

LT FROM A:                123       1308      1185      A       3.04          0.10

ALL MOVES FROM C:          84        664       580      A       6.20          0.14

ALL MOVES FROM D:         722        706       -16      F   INFINITE      INFINITE
```

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:12-16-1988             TIME:16:58:38
BEDFORD/CHAUNCY/LP GARAGE ~~EXISTING~~ CONDITIONS: PM PEAK HOUR
                           No Build

LAST DATASETS LOADED OR SAVED
VOLUME=I6NBPM     GEOMETRICS=KBINT6
KEY:   D
       |
     A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
          FROM D: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: YES
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: LP GARAGE EXIT
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: BEDFORD ST WB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: CHAUNCY ST  B: CHAUNCY ST  C: LP GARAGE E D: BEDFORD ST
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: CHAUNCY ST  B: CHAUNCY ST  C: LP GARAGE E D: BEDFORD ST
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME           74  168   53    0    1    0   74  286  108  316  167   54
PHF               0.94           0.94           0.94           0.94
ADJ VOLUME       79  179   56    0    1    0   79  304  115  336  178   57
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR      87              0             87  335  126  370  195   63

STEP 1 RIGHT TURNS FROM     C:LP GARAGE EXIT          D:BEDFORD ST WB
CONFLICTING FLOWS                       89                   1
CRITICAL GAPS                          5.0                 5.0
CAPACITY                              1099                1199
CAPACITY USED                           11%                  5%
IMPEDANCE FACTOR                      0.93                0.97
ACTUAL CAPACITY                       1099                1199
```

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1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:12-16-1988              TIME:16:58:38
BEDFORD/CHAUNCY/LP GARAGE EXISTING CONDITIONS: PM PEAK HOUR

STEP 2 LEFT TURNS FROM      B:CHAUNCY ST SB          A:CHAUNCY ST NB
CONFLICTING FLOWS                       179                        1
CRITICAL GAPS                           4.5                      4.5
CAPACITY                               1117                     1308
CAPACITY USED                            0%                       7%
IMPEDANCE FACTOR                       1.00                     0.96
ACTUAL CAPACITY                        1117                     1308

STEP 3 THRU MOVES FROM      C:LP GARAGE EXIT         D:BEDFORD ST WB
CONFLICTING FLOWS                       259                      259
CRITICAL GAPS                           5.5                      5.5
CAPACITY                                831                      831
CAPACITY USED                           40%                      24%
IMPEDANCE FACTOR                       0.67                     0.83
ACTUAL CAPACITY                         800                      800

STEP 4 LEFT TURNS FROM      C:LP GARAGE EXIT         D:BEDFORD ST WB
CONFLICTING FLOWS                       494                      678
CRITICAL GAPS                           6.0                      6.0
CAPACITY                                555                      433
ACTUAL CAPACITY                         431                      261

                     SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT                DEMAND    CAPACITY  RESERVE    LOS  AVG DEL(SEC) AVG QUE

LT FROM A:                 87        1308      1221     A      2.95         0.07

ALL MOVES FROM C:         548         746       198     D     18.16         2.76

ALL MOVES FROM D:         628         366      -262     F   INFINITE    INFINITE
```

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:12-21-1988             TIME:10:12:36
BEDFORD/CHAUNCY/LP GARAGE NO BUILD CONDITIONS: SAT PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=I6NBSAT    GEOMETRICS=KBINT6
KEY:   D
       |
     A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
          FROM D: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: YES
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: LP GARAGE EXIT
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: BEDFORD ST WB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: CHAUNCY ST  B: CHAUNCY ST  C: LP GARAGE E D: BEDFORD ST
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: CHAUNCY ST  B: CHAUNCY ST  C: LP GARAGE E D: BEDFORD ST
                 LT  TH    RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME           64  134   93    0    0    1   33  116   32  327  116   96
PHF               0.85           0.85           0.85           0.85
ADJ VOLUME       75  158  109    0    0    1   39  136   38  385  136  113
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR      83              0             43  150   41  423  150  124


STEP 1 RIGHT TURNS FROM     C:LP GARAGE EXIT         D:BEDFORD ST WB
CONFLICTING FLOWS                       79                   1
CRITICAL GAPS                          5.0                 5.0
CAPACITY                              1111                1199
CAPACITY USED                            4%                 10%
IMPEDANCE FACTOR                      0.98                0.94
ACTUAL CAPACITY                       1111                1199
```

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1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:12-21-1988              TIME:10:12:36
BEDFORD/CHAUNCY/LP GARAGE NO BUILD CONDITIONS: SAT PEAK HOUR

STEP 2 LEFT TURNS FROM     B:CHAUNCY ST SB          A:CHAUNCY ST NB
CONFLICTING FLOWS                     158                        1
CRITICAL GAPS                         4.5                      4.5
CAPACITY                             1138                     1308
CAPACITY USED                          0%                       6%
IMPEDANCE FACTOR                     1.00                     0.96
ACTUAL CAPACITY                      1138                     1308


STEP 3 THRU MOVES FROM     C:LP GARAGE EXIT         D:BEDFORD ST WB
CONFLICTING FLOWS                     234                      234
CRITICAL GAPS                         5.5                      5.5
CAPACITY                              855                      855
CAPACITY USED                          18%                      18%
IMPEDANCE FACTOR                     0.88                     0.88
ACTUAL CAPACITY                       825                      825


STEP 4 LEFT TURNS FROM     C:LP GARAGE EXIT         D:BEDFORD ST WB
CONFLICTING FLOWS                     484                      408
CRITICAL GAPS                         6.0                      6.0
CAPACITY                              562                      621
ACTUAL CAPACITY                       447                      517


                       SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT                  DEMAND    CAPACITY   RESERVE   LOS   AVG DEL(SEC)  AVG QUE

LT FROM A:                   83       1308       1225     A        2.94          0.07

ALL MOVES FROM C:           234        744        510     A        7.06          0.46

ALL MOVES FROM D:           698        632        -65     F    INFINITE      INFINITE
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/SURFACE ARTERY/LINCOLN STREETS
NO-BUILD CONDITIONS: AM PEAK HOUR
date:12-20-1988             time:10:58:16
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I7NBAM     GEOMETRICS=KBINT7A    SIGNAL=KBINT7
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH    RT    LT TH RT      LT   TH    RT    WALK
EB  159  587  155     1  3  1    12.0 12.0 15.0    52
WB   54 1069   21     0  3  0     0.0 12.0  0.0    30
NB   43  530   13     0  3  0     0.0 11.0  0.0    56
SB   80  770   51     0  3  1     0.0 11.0 15.0    66

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK               PEDESTRIANS      ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0   10  .870   30   Y    12.0    3
WB  0.0%  2.0%   Y    10   10  .870  200   Y    12.0    3
NB  0.0%  2.0%   N     0   20  .870   90   Y    15.5    3
SB  0.0%  2.0%   N     0   25  .870  380   Y    15.5    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *                          *           *  10.7   4    A
 2           *           *  *  *  *     *  *  *     11.9   4    A
 3           *           *              *  *  *      1.2   4    A
 4              *  *  *              *           *  22.6   4    A

CYCLE=  62.5

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV    PHF  LTFR THFR RTFR
EB   159  587  155  .870   183  675  178
WB    54 1069   21  .870    62 1229   24
NB    43  530   13  .870    49  609   15
SB    80  770   51  .870    92  885   59

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N    LU     v  Plt  Prt
EB  LT           183 1 1.00  183 1.00 0.00
EB  TH           675 3 1.10  742 0.00 0.00
EB  RT           178 1 1.00  178 0.00 1.00
WB  LT-TH-RT    1315 3 1.10 1446 0.05 0.02
NB  LT-TH-RT     674 3 1.10  741 0.07 0.02
SB  LT-TH        977 3 1.10 1075 0.09 0.00
SB  RT            59 1 1.00   59 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT    VOLUME
EASTBOUND        62 1229   24         0    0    0        0   3   0       0
WESTBOUND       183  675  178         0    0    0        1   3   1       0
NORTHBOUND       92  885   59         0   70    0        0   3   1     616
SOUTHBOUND       49  609   15       100  100  100        0   3   0     674

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP   IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  LT          1800 1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
EB  TH          1800 3 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 4812
EB  RT          1800  1 1.100 0.990 1.000 1.000 0.958 0.900 0.807 1.000 1365
WB  LT-TH-RT    1800  3 1.000 0.990 1.000 0.950 0.986 0.900 0.994 0.991 4438
NB  LT-TH-RT    1800  3 0.967 0.990 1.000 1.000 0.972 0.900 0.995 0.933 4196
SB  LT-TH       1800  3 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.936 4354
SB  RT          1800  1 1.100 0.990 1.000 1.000 0.896 0.900 0.836 1.000 1321

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
NB  63  12  3  674  674   49 0.07  3  616 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt    Gf       El    Fm   Flt
NB 5400 0.114  5.419 0.490 0.318  6.507 0.682  3.055    2.295 0.799 0.933

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT         183 1524 0.12 0.17  261 0.70
EB  TH         742 4812 0.15 0.17  825 0.90     *
EB  RT         178 1365 0.13 0.17  234 0.76
WB  LT-TH-RT  1446 4438 0.33 0.36 1608 0.90     *
NB  LT-TH-RT   741 4196 0.18 0.19  801 0.93
SB  LT-TH     1075 4354 0.25 0.27 1194 0.90     *
SB  RT          59 1321 0.04 0.27  362 0.16

CYCLE= 62.5  LOST=12.0  SUM V/S CRIT= 0.73 TOTAL V/C= 0.90

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT        0.70 0.17  62.5  18.53  261    5.46 1.00  23.98  C    2.6     4
EB  TH        0.90 0.17  62.5  19.28  825    9.19 0.85  24.20  C    9.7    15
EB  RT        0.76 0.17  62.5  18.75  234    9.19 0.85  23.75  C    2.6     4
WB  LT-TH-RT  0.90 0.36  62.5  14.33 1608    5.27 0.85  16.66  C   14.6    19
NB  LT-TH-RT  0.93 0.19  62.5  18.88  801   11.91 0.85  26.17  D    9.6    16
SB  LT-TH     0.90 0.27  62.5  16.60 1194    6.78 0.85  19.88  C   12.3    17
SB  RT        0.16 0.27  62.5  13.09  362    0.02 0.85  11.14  B    0.7     1

DIR Delay LOS
EB  24.09  C
WB  16.66  C
NB  26.17  D
SB  19.43  C
INTERSECTION DELAY = 20.81 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  62.5 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  51.1 SECONDS
for chosen cycle length  62.5
suggested timing phase 1 is  10.7 secs green,   4.0 secs yellow + red clear
suggested timing phase 2 is  12.7 secs green,   4.0 secs yellow + red clear
suggested timing phase 3 is   0.4 secs green,   4.0 secs yellow + red clear
suggested timing phase 4 is  22.6 secs green,   4.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/SURFACE ARTERY/LINCOLN STREETS
NO-BUILD CONDITIONS: PM PEAK HOUR
date:12-20-1988             time:11:02:39
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I7NBPM     GEOMETRICS=KBINT7PS   SIGNAL=KBINT7
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB  148  811  628    1  3  1    12.0 12.0 15.0    52
WB   37  503   13    0  2  0     0.0 12.0  0.0    30
NB   40  733   14    0  3  0     0.0 11.0  0.0    56
SB   38 1299   16    0  3  1     0.0 11.0 15.0    66

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS      ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0    10   .940   15   Y    12.0    3
WB  0.0%  2.0%   Y    10    10   .940  180   Y    12.0    3
NB  0.0%  2.0%   N     0    20   .940  100   Y    15.5    3
SB  0.0%  2.0%   N     0    25   .940  310   Y    15.5    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *                          *           *  50.4  4    A
 2           *           *  *  *  *     *  *  *     30.1  4    A
 3           *           *              *  *  *      1.3  4    A
 4              *  *  *              *           *  22.2  4    A

CYCLE= 120.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB   148  811  628  .940   157  863  668
WB    37  503   13  .940    39  535   14
NB    40  733   14  .940    43  780   15
SB    38 1299   16  .940    40 1382   17

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
EB  LT         157 1 1.00  157 1.00 0.00
EB  TH         863 3 1.10  949 0.00 0.00
EB  RT         668 1 1.00  668 0.00 1.00
WB  LT-TH-RT   588 2 1.05  618 0.07 0.02
NB  LT-TH-RT   837 3 1.10  921 0.05 0.02
SB  LT-TH     1422 3 1.10 1565 0.03 0.00
SB  RT          17 1 1.00   17 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN     # LANES     OPPOSING
                 LT   TH   RT         LT   TH   RT         LT  TH  RT     VOLUME
EASTBOUND        39  535   14          0    0    0         0   2   0       0
WESTBOUND       157  863  668          0    0    0         1   3   1       0
NORTHBOUND       40 1382   17          0    0    0         0   3   1       0
SOUTHBOUND       43  780   15        100  100  100         0   3   0     837

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N   Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  LT         1800 1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
EB  TH         1800 3 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 4812
EB  RT        1800  1 1.100 0.990 1.000 1.000 0.958 0.900 0.802 1.000 1357
WB  LT-TH-RT  1800  2 1.000 0.990 1.000 0.925 0.979 0.900 0.993 0.987 2845
NB  LT-TH-RT  1800  3 0.967 0.990 1.000 1.000 0.972 0.900 0.996 0.992 4467
SB  LT-TH     1800  3 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.971 4515
SB  RT        1800  1 1.100 0.990 1.000 1.000 0.896 0.900 0.843 1.000 1332

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT        157 1524 0.10 0.42  639 0.25
EB  TH        949 4812 0.20 0.42 2019 0.47
EB  RT        668 1357 0.49 0.42  569 1.17     *
WB  LT-TH-RT  618 2845 0.22 0.19  526 1.17     *
NB  LT-TH-RT  921 4467 0.21 0.25 1121 0.82
SB  LT-TH    1565 4515 0.35 0.30 1333 1.17     *
SB  RT         17 1332 0.01 0.30  393 0.04

CYCLE=120.0  LOST=12.0  SUM V/S CRIT= 1.06 TOTAL V/C= 1.17

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT       0.25 0.42 120.0  17.13  639    0.04 1.00   17.17  C   3.0    3
EB  TH       0.47 0.42 120.0  19.13 2019    0.13 0.85   16.37  C  16.7   17
EB  RT       1.17 0.42 120.0  30.26  569  101.11 0.85  111.66  F  27.2   63
WB  LT-TH-RT 1.17 0.19 120.0  38.69  526  102.37 0.85  119.90  F  27.6   60
NB  LT-TH-RT 0.82 0.25 120.0  32.23 1121    3.53 0.85   30.39  D  20.9   22
SB  LT-TH    1.17 0.30 120.0  34.65 1333   91.35 0.85  107.10  F  59.0  128
SB  RT       0.04 0.30 120.0  22.94  393    0.00 0.85   19.50  C   0.4    1

DIR Delay LOS
EB  52.32  E
WB 119.90  F
NB  30.39  D
SB 106.16  F
INTERSECTION DELAY = 74.12 INTERSECTION LOS=F

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 120.0 SECONDS

THE V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS
for chosen cycle length 120.0
suggested timing phase 1 is  50.4 secs green,   4.0 secs yellow + red clear
suggested timing phase 2 is  26.3 secs green,   4.0 secs yellow + red clear
suggested timing phase 3 is   5.2 secs green,   4.0 secs yellow + red clear
suggested timing phase 4 is  22.2 secs green,   4.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/SURFACE ARTERY/LINCOLN STREETS
NO BUILD CONDITIONS: SAT PEAK HOUR
date:12-20-1988              time:19:41:50
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I7NBSAT    GEOMETRICS=KBINT7PS   SIGNAL=KBINT7
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES         # OF LANES      LANE WIDTH      CROSS
DIR  LT   TH   RT      LT TH RT      LT   TH   RT      WALK
EB   47  575  401       1  3  1    12.0 12.0 15.0      52
WB   27  373    3       0  2  0     0.0 12.0  0.0      30
NB   70  486    2       0  3  0     0.0 11.0  0.0      56
SB   22  666   20       0  3  1     0.0 11.0 15.0      66

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N      0     0  .870   30   Y     16.0    3
WB  0.0%  2.0%   Y     10     0  .870   50   Y     16.0    3
NB  0.0%  2.0%   N      0     0  .870   50   Y     15.5    3
SB  0.0%  2.0%   N      0    10  .870  200   Y     15.5    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *                          *           *  22.5   4    A
 2           *           *  *  *  *     *  *  *      9.6   4    A
 3           *           *              *  *  *      0.0   0    A
 4              *  *  *              *           *  11.8   4    A

CYCLE=  56.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR   LTV   THV   RTV    PHF   LTFR  THFR  RTFR
EB     47   575   401   .870    54   661   461
WB     27   373     3   .870    31   429     3
NB     70   486     2   .870    80   559     2
SB     22   666    20   .870    25   766    23

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N   LU     v   Plt  Prt
EB  LT           54 1 1.00    54 1.00 0.00
EB  TH          661 3 1.10   727 0.00 0.00
EB  RT          461 1 1.00   461 0.00 1.00
WB  LT-TH-RT    463 2 1.05   486 0.07 0.01
NB  LT-TH-RT    641 3 1.10   706 0.13 0.00
SB  LT-TH       791 3 1.10   870 0.03 0.00
SB  RT           23 1 1.00    23 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                  OPPOSING APPROACH
BEING OPPOSED        VOLUMES         % OPPOSING LEFT TURN       # LANES       OPPOSING
                  LT   TH   RT          LT    TH    RT         LT  TH  RT       VOLUME
EASTBOUND         31  429    3           0     0     0          0   2   0            0
WESTBOUND         54  661  461           0     0     0          1   3   1            0
NORTHBOUND        25  766   23         100   100     0          0   3   1          791
SOUTHBOUND        80  559    2         100   100   100          0   3   0          641

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP   IDEAL N  Fwid   Fhv   Fgr  Fpark  Fbus  Farea   Frt   Flt     s
EB  LT          1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
EB  TH          1800  3 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 4812
EB  RT        1800  1 1.100 0.990 1.000 1.000 1.000 0.900 0.826 1.000 1458
WB  LT-TH-RT  1800  2 1.000 0.990 1.000 0.925 1.000 0.900 0.998 0.988 2926
NB  LT-TH-RT  1800  3 0.967 0.990 1.000 1.000 1.000 0.900 0.999 0.841 3911
SB  LT-TH     1800  3 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.979 4553
SB  RT        1800  1 1.100 0.990 1.000 1.000 0.958 0.900 0.836 1.000 1413

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
NB  56  10  3  641  641   80 0.13  3  791 0.03
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
NB 5173 0.153  1.285 0.381 0.611  8.364 0.389  1.250    2.955 0.524 0.841

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s v/s   g/C    c v/c   CRITICAL
EB  LT          54 1524 0.04 0.40  613 0.09
EB  TH         727 4812 0.15 0.40 1936 0.38
EB  RT         461 1458 0.32 0.40  587 0.79     *
WB  LT-TH-RT   486 2926 0.17 0.21  619 0.79     *
NB  LT-TH-RT   706 3911 0.18 0.17  674 1.05
SB  LT-TH      870 4553 0.19 0.17  785 1.11     *
SB  RT          23 1413 0.02 0.17  243 0.09

CYCLE= 56.0  LOST= 8.0  SUM V/S CRIT= 0.67 TOTAL V/C= 0.79

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF  Delay LOS  Avg Q  95% Q
EB  LT       0.09 0.40  56.0   7.88  613    0.00 1.00    7.88  B   0.5    1
EB  TH       0.38 0.40  56.0   8.95 1936    0.06 0.85    7.66  B   6.1    6
EB  RT       0.79 0.40  56.0  11.11  587    4.83 0.85   13.55  B   4.3    6
WB  LT-TH-RT 0.79 0.21  56.0  15.87  619    4.60 0.85   17.40  C   5.7    8
NB  LT-TH-RT 1.05 0.17  56.0  17.79  674   40.06 0.85   49.17  E  12.9   27
SB  LT-TH    1.11 0.17  56.0  18.02  785   62.63 0.85   68.56  F  20.2   46
SB  RT       0.09 0.17  56.0  14.82  243    0.01 0.85   12.60  B   0.3    1

DIR Delay LOS
EB   9.86  B
WB  17.40  C
NB  49.17  E
SB  67.12  F
INTERSECTION DELAY = 34.67 INTERSECTION LOS=D

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  27.4 SECONDS
for chosen cycle length  60.0
suggested timing phase 1 is  24.4 secs green,   4.0 secs yellow + red clear
suggested timing phase 2 is  13.0 secs green,   4.0 secs yellow + red clear
suggested timing phase 3 is   0.0 secs green,  -2.2 secs yellow + red clear
suggested timing phase 4 is  12.8 secs green,   4.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:12-20-1988             TIME:10:30:05
KINGSTON/ESSEX/AVE DE LAFAYETTE NO-BUILD CONDITIONS: AM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=I9NBAM     GEOMETRICS=KBINT9A
KEY:   D
       |
     A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
          FROM D: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: YES
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: KINGSTON NB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: KINGSTON SB
EXCLUSIVE LEFT TURN LANES: YES
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: ESSEX EB    B: ESSEX WB    C: KINGSTON NB D: KINGSTON SB
LEFTS            0.00            0.00           0.00           0.00
THRUS            0.00            0.00           0.00           0.00
RIGHTS           0.00            0.00           0.00           0.00


APPROACH        A: ESSEX EB    B: ESSEX WB    C: KINGSTON NB D: KINGSTON SB
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0  705   44    0    0    1    0    0    1  233   98    0
PHF               0.94           0.94           0.94           0.94
ADJ VOLUME        0  750   47    0    0    1    0    0    1  248  104    0
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR       0              0              0    0    1  273  115    0

STEP 1 RIGHT TURNS FROM     C:KINGSTON NB            D:KINGSTON SB
CONFLICTING FLOWS                      375                   1
CRITICAL GAPS                          5.0                 5.0
CAPACITY                               818                1199
CAPACITY USED                            0%                  0%
IMPEDANCE FACTOR                      1.00                1.00
ACTUAL CAPACITY                        818                1199
```

```
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:12-20-1988             TIME:10:30:05
KINGSTON/ESSEX/AVE DE LAFAYETTE NO-BUILD CONDITIONS: AM PEAK HOUR

STEP 2 LEFT TURNS FROM     B:ESSEX WB                 A:ESSEX EB
CONFLICTING FLOWS                      750                       1
CRITICAL GAPS                          4.5                     4.5
CAPACITY                               636                    1308
CAPACITY USED                            0%                      0%
IMPEDANCE FACTOR                      1.00                    1.00
ACTUAL CAPACITY                        636                    1308


STEP 3 THRU MOVES FROM     C:KINGSTON NB              D:KINGSTON SB
CONFLICTING FLOWS                      751                     751
CRITICAL GAPS                          5.5                     5.5
CAPACITY                               457                     457
CAPACITY USED                            0%                     25%
IMPEDANCE FACTOR                      1.00                    0.82
ACTUAL CAPACITY                        457                     457


STEP 4 LEFT TURNS FROM     C:KINGSTON NB              D:KINGSTON SB
CONFLICTING FLOWS                      855                     752
CRITICAL GAPS                          6.0                     6.0
CAPACITY                               337                     391
ACTUAL CAPACITY                        275                     391


                      SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT                 DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUEU


ALL MOVES FROM C:            1        818       817     A       4.41         0.00

LT FROM D:                 273        391       118     D      30.50         2.31
SHARED TH/RT FROM D:       115        457       343     B      10.51         0.33
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:12-21-1988             TIME:10:18:28
KINGSTON/ESSEX/AVE DE LAFAYETTE NO BUILD CONDITIONS: SAT PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=I9NBSAT    GEOMETRICS=KBINT9A
KEY:   D
       |
     A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
          FROM D: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: YES
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: KINGSTON NB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: KINGSTON SB
EXCLUSIVE LEFT TURN LANES: YES
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: ESSEX EB    B: ESSEX WB    C: KINGSTON NB D: KINGSTON SB
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: ESSEX EB    B: ESSEX WB    C: KINGSTON NB D: KINGSTON SB
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0  729   91    0    0    1    0    0    1  301  172    0
PHF               0.93           0.93           0.93           0.93
ADJ VOLUME        0  784   98    0    0    1    0    0    1  324  185    0
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR       0              0              0    0    1  356  203    0

STEP 1 RIGHT TURNS FROM     C:KINGSTON NB            D:KINGSTON SB
CONFLICTING FLOWS                      392                   1
CRITICAL GAPS                          5.0                 5.0
CAPACITY                               804                1199
CAPACITY USED                            0%                  0%
IMPEDANCE FACTOR                      1.00                1.00
ACTUAL CAPACITY                        804                1199
```

```
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:12-21-1988            TIME:10:18:28
KINGSTON/ESSEX/AVE DE LAFAYETTE NO BUILD CONDITIONS: SAT PEAK HOUR

STEP 2 LEFT TURNS FROM     B:ESSEX WB               A:ESSEX EB
CONFLICTING FLOWS                      784                   1
CRITICAL GAPS                          4.5                 4.5
CAPACITY                               613                1308
CAPACITY USED                           0%                  0%
IMPEDANCE FACTOR                      1.00                1.00
ACTUAL CAPACITY                        613                1308


STEP 3 THRU MOVES FROM     C:KINGSTON NB            D:KINGSTON SB
CONFLICTING FLOWS                      785                 784
CRITICAL GAPS                          5.5                 5.5
CAPACITY                               437                 438
CAPACITY USED                           0%                 46%
IMPEDANCE FACTOR                      1.00                0.61
ACTUAL CAPACITY                        437                 438


STEP 4 LEFT TURNS FROM     C:KINGSTON NB            D:KINGSTON SB
CONFLICTING FLOWS                      970                 785
CRITICAL GAPS                          6.0                 6.0
CAPACITY                               286                 373
ACTUAL CAPACITY                        175                 373


                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT                   DEMAND    CAPACITY  RESERVE    LOS  AVG DEL(SEC) AVG QUEU


ALL MOVES FROM C:             1        804       802       A        4.49         0.00

LT FROM D:                  356        373        17       E      217.79        21.54
SHARED TH/RT FROM D:        203        438       234       C       15.37         0.87
```

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:12-16-1988             TIME:11:59:52
ESSEX/HARRISON NO BUILD CONDITIONS: AM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=I10NBAM    GEOMETRICS=KBINT10A
KEY:   D
       |
     A-|-B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: YIELD
          FROM D: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: HARRISON NB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: HARRISON SB
EXCLUSIVE LEFT TURN LANES: YES
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: ESSEX EB    B: ESSEX WB    C: HARRISON NB D: HARRISON SB
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: ESSEX EB    B: ESSEX WB    C: HARRISON NB D: HARRISON SB
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME          446  698  170    0    0    1    0    0    1   60   76    0
PHF               0.91           0.91           0.91           0.91
ADJ VOLUME      490  767  187    0    0    1    0    0    1   66   84    0
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR     539              0              0    0    1   73   92    0

STEP 1 RIGHT TURNS FROM     C:HARRISON NB            D:HARRISON SB
CONFLICTING FLOWS                      477                   1
CRITICAL GAPS                          4.5                 5.0
CAPACITY                               841                1199
CAPACITY USED                            0%                  0%
IMPEDANCE FACTOR                      1.00                1.00
ACTUAL CAPACITY                        841                1199
```

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1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:12-16-1988             TIME:11:59:52
ESSEX/HARRISON NO BUILD CONDITIONS: AM PEAK HOUR

STEP 2 LEFT TURNS FROM     B:ESSEX WB               A:ESSEX EB
CONFLICTING FLOWS                      954                   1
CRITICAL GAPS                          4.5                 4.5
CAPACITY                               509                1308
CAPACITY USED                            0%                 41%
IMPEDANCE FACTOR                      1.00                0.66
ACTUAL CAPACITY                        509                1308

STEP 3 THRU MOVES FROM     C:HARRISON NB            D:HARRISON SB
CONFLICTING FLOWS                     1352                1445
CRITICAL GAPS                          5.0                 5.5
CAPACITY                               250                 173
CAPACITY USED                            0%                 53%
IMPEDANCE FACTOR                      1.00                0.54
ACTUAL CAPACITY                        166                 115

STEP 4 LEFT TURNS FROM     C:HARRISON NB            D:HARRISON SB
CONFLICTING FLOWS                     1435                1446
CRITICAL GAPS                          5.5                 6.0
CAPACITY                               175                 136
ACTUAL CAPACITY                         63                  90

                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT               DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUEUE

LT FROM A:                539       1308       769     A      4.68         0.70

ALL MOVES FROM C:           1        841       840     A      4.29         0.00

LT FROM D:                 73         90        18     E    201.65         4.06
SHARED TH/RT FROM D:       92        115        23     E    158.11         4.03
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:12-21-1988             TIME:10:26:41
ESSEX/HARRISON NO BUILD CONDITIONS: SAT PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=I10NBSAT   GEOMETRICS=KBINT10
KEY:   D
       |
     A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: YIELD
          FROM D: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: YES
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: HARRISON NB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: HARRISON SB
EXCLUSIVE LEFT TURN LANES: YES
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: ESSEX EB    B: ESSEX WB    C: HARRISON NB D: HARRISON SB
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: ESSEX EB    B: ESSEX WB    C: HARRISON NB D: HARRISON SB
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME          332  698  245    0    0    1    0    0    1  165  115    0
PHF               0.77           0.77           0.77           0.77
ADJ VOLUME      431  906  318    0    0    1    0    0    1  214  149    0
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR     474              0              0    0    1  236  164    0


STEP 1 RIGHT TURNS FROM     C:HARRISON NB            D:HARRISON SB
CONFLICTING FLOWS                      453                      1
CRITICAL GAPS                          4.5                    5.0
CAPACITY                               861                   1199
CAPACITY USED                            0%                     0%
IMPEDANCE FACTOR                      1.00                   1.00
ACTUAL CAPACITY                        861                   1199
```

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1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:12-21-1988            TIME:10:26:41
ESSEX/HARRISON NO BUILD CONDITIONS: SAT PEAK HOUR

STEP 2 LEFT TURNS FROM     B:ESSEX WB               A:ESSEX EB
CONFLICTING FLOWS                      906                   1
CRITICAL GAPS                          4.5                 4.5
CAPACITY                               536                1308
CAPACITY USED                            0%                 36%
IMPEDANCE FACTOR                      1.00                0.71
ACTUAL CAPACITY                        536                1308

STEP 3 THRU MOVES FROM     C:HARRISON NB            D:HARRISON SB
CONFLICTING FLOWS                     1339                1338
CRITICAL GAPS                          5.0                 5.5
CAPACITY                               255                 203
CAPACITY USED                            0%                 81%
IMPEDANCE FACTOR                      1.00                0.24
ACTUAL CAPACITY                        181                 144

STEP 4 LEFT TURNS FROM     C:HARRISON NB            D:HARRISON SB
CONFLICTING FLOWS                     1488                1340
CRITICAL GAPS                          5.5                 6.0
CAPACITY                               161                 162
ACTUAL CAPACITY                         28                 115

                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT               DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUEUE

LT FROM A:               474       1308       833     A      4.32         0.57

ALL MOVES FROM C:          1        861       859     A      4.19         0.00

LT FROM D:               236        115      -120     F   INFINITE    INFINITE
SHARED TH/RT FROM D:     164        144       -20     F   INFINITE    INFINITE
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/WASHINGTON
NO BUILD CONDITIONS: AM PEAK HOUR
date:12-16-1988             time:12:07:36
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I11NBAM    GEOMETRICS=KBINT11    SIGNAL=KBINT11
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES     # OF LANES      LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB  149  770    0     1  2  0    11.0 11.0  0.0    28
WB    0    0    0     0  0  0     0.0  0.0  0.0    31
NB    0  459  544     0  2  1     0.0 11.0 11.0    36
SB    0    0    0     0  0  0     0.0  0.0  0.0    36

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK            PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0    0   .930  200   Y     11.8    3
WB  0.0%  0.0%         0    0   .000  200         11.8    0
NB  0.0%  2.0%   N     0    0   .930  550   Y     13.0    3
SB  0.0%  0.0%         0    0   .000  750   Y     13.0    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *                             *           *  19.4   3    A
 2           *           *     *  *                 34.6   3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB   149  770    0  .930   160  828    0
WB     0    0    0  .000     0    0    0
NB     0  459  544  .930     0  494  585
SB     0    0    0  .000     0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
EB  LT         160 1 1.00  160 1.00 0.00
EB  TH         828 2 1.05  869 0.00 0.00
NB  TH         494 2 1.05  518 0.00 0.00
NB  RT         585 1 1.00  585 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN     # LANES     OPPOSING
                 LT   TH   RT         LT   TH   RT        LT  TH  RT     VOLUME
EASTBOUND         0    0    0          0    0    0         0   0   0         0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  LT        1800  1 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1473
EB  TH        1800  2 0.967 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3101
NB  TH        1800  2 0.967 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3101
NB  RT        1800  1 0.967 0.990 1.000 1.000 1.000 0.900 0.755 1.000 1170

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s   g/C    c v/c   CRITICAL
EB  LT        160 1473 0.11 0.32  476 0.34
EB  TH        869 3101 0.28 0.32 1003 0.87     *
NB  TH        518 3101 0.17 0.58 1788 0.29
NB  RT        585 1170 0.50 0.58  675 0.87     *
```

```
CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.78 TOTAL V/C= 0.87

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT       0.34 0.32  60.0  11.71  476    0.17 1.00   11.88  B   1.8
EB  TH       0.87 0.32  60.0  14.50 1003    5.79 0.85   17.25  C   9.3
NB  TH       0.29 0.58  60.0   4.91 1788    0.03 0.85    4.19  A   3.5
NB  RT       0.87 0.58  60.0   8.17  675    8.13 0.85   13.86  B   4.3

DIR Delay LOS
EB  16.41  C
NB   9.32  B
INTERSECTION DELAY = 12.74 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  33.6 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/WASHINGTON
NO BUILD CONDITIONS: PM PEAK HOUR
date:12-19-1988             time:13:05:51
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I11NBPM    GEOMETRICS=KBINT11    SIGNAL=kbint11
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB  124  949    0     1  2  0    11.0 11.0  0.0     28
WB    0    0    0     0  0  0     0.0  0.0  0.0     31
NB    0  231  724     0  2  1     0.0 11.0 11.0     36
SB    0    0    0     0  0  0     0.0  0.0  0.0     36

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                PEDESTRIANS       ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0    0   .910  200   Y    11.8    3
WB  0.0%  0.0%         0    0   .000  200        11.8    0
NB  0.0%  2.0%   N     0    0   .910  590   Y    13.0    3
SB  0.0%  0.0%         0    0   .000  750   Y    13.0    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *                                *           *  39.0   3    A
 2           *           *     *  *                    75.0   3    A

CYCLE= 120.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB   124  949    0  .910   136 1043    0
WB     0    0    0  .000     0    0    0
NB     0  231  724  .910     0  254  796
SB     0    0    0  .000     0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU     v  Plt  Prt
EB  LT         136 1 1.00   136 1.00 0.00
EB  TH        1043 2 1.05  1095 0.00 0.00
NB  TH         254 2 1.05   267 0.00 0.00
NB  RT         796 1 1.00   796 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN     # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT        LT  TH  RT     VOLUME
EASTBOUND         0    0    0         0    0    0         0   0   0        0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt     s
EB  LT        1800  1 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1473
EB  TH        1800  2 0.967 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3101
NB  TH        1800  2 0.967 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3101
NB  RT        1800  1 0.967 0.990 1.000 1.000 1.000 0.900 0.755 1.000 1170
```

```
CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT        136 1473 0.09 0.32  478 0.28
EB  TH       1095 3101 0.35 0.32 1007 1.09     *
NB  TH        267 3101 0.09 0.63 1939 0.14
NB  RT        796 1170 0.68 0.63  732 1.09     *

CYCLE=120.0  LOST= 6.0  SUM V/S CRIT= 1.03 TOTAL V/C= 1.09

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT       0.28 0.32 120.0 22.91  478    0.09 1.00  23.00  C   3.1
EB  TH       1.09 0.32 120.0 32.14 1007   50.14 0.85  69.94  F  32.0
NB  TH       0.14 0.63 120.0  7.01 1939    0.00 0.85   5.96  B   3.2
NB  RT       1.09 0.63 120.0 20.00  732   54.11 0.85  63.00  F  18.9

DIR Delay LOS
EB  64.75  F
NB  48.68  E
INTERSECTION DELAY = 57.31 INTERSECTION LOS=E

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 120.0 SECONDS

THE V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/WASHINGTON
NO BUILD CONDITIONS: SAT PEAK HOUR
date:12-20-1988            time:20:14:54
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I11NBSAT   GEOMETRICS=KBINT11    SIGNAL=KBINT11
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB  144  886    0     1  2  0    11.0 11.0  0.0    28
WB    0    0    0     0  0  0     0.0  0.0  0.0    31
NB    0  300  376     0  2  1     0.0 11.0 11.0    36
SB    0    0    0     0  0  0     0.0  0.0  0.0    36

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0    0   .930  200   Y    11.8    3
WB  0.0%  0.0%         0    0   .000  200        11.8    0
NB  0.0%  2.0%   N     0   10   .930  550   Y    13.0    3
SB  0.0%  0.0%         0    0   .000  750   Y    13.0    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *                             *           *  25.5   3    A
 2          *           *     *  *                  28.5   3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB   144  886    0  .930   155  953    0
WB     0    0    0  .000     0    0    0
NB     0  300  376  .930     0  323  404
SB     0    0    0  .000     0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU      v Plt  Prt
EB  LT         155 1 1.00  155 1.00 0.00
EB  TH         953 2 1.05 1000 0.00 0.00
NB  TH         323 2 1.05  339 0.00 0.00
NB  RT         404 1 1.00  404 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT    VOLUME
EASTBOUND         0    0    0         0    0    0        0   0   0        0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  LT        1800  1 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1473
EB  TH        1800  2 0.967 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3101
NB  TH        1800  2 0.967 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3101
NB  RT        1800  1 0.967 0.990 1.000 1.000 0.958 0.900 0.755 1.000 1121

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT        155 1473 0.11 0.43  626 0.25
EB  TH       1000 3101 0.32 0.43 1318 0.76     *
NB  TH        339 3101 0.11 0.47 1473 0.23
NB  RT        404 1121 0.36 0.47  533 0.76     *
```

```
CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.68 TOTAL V/C= 0.76

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT        0.25 0.43  60.0   8.42  626    0.04 1.00   8.47  B    1.5    2
EB  TH        0.76 0.43  60.0  11.13 1318    1.83 0.85  11.02  B    9.1   10
NB  TH        0.23 0.47  60.0   7.06 1473    0.01 0.85   6.01  B    2.8    3
NB  RT        0.76 0.47  60.0   9.83  533    4.32 0.85  12.03  B    3.5    5

DIR Delay LOS
EB  10.68  B
NB   9.28  B
INTERSECTION DELAY = 10.13 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  21.4 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:12-16-1988             TIME:12:13:29
BEACH/HARRISON NO BUILD CONDITIONS: AM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=I12NBAM   GEOMETRICS=KBINT12A
KEY:   D
       |
     A-|-B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
          FROM D: YIELD
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: BEACH WB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: BEACH EB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: HARRISON NB B: HARRISON SB C: BEACH WB    D: BEACH EB
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: HARRISON NB B: HARRISON SB C: BEACH WB    D: BEACH EB
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0    0    1    0  206   39   70   35    0    0    0    1
PHF               0.88           0.88           0.88           0.88
ADJ VOLUME        0    0    1    0  234   44   80   40    0    0    0    1
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR       0              0             88   44    0    0    0    1

STEP 1 RIGHT TURNS FROM     C:BEACH WB               D:BEACH EB
CONFLICTING FLOWS                        1                 139
CRITICAL GAPS                          5.0                 4.5
CAPACITY                              1199                1157
CAPACITY USED                            0%                  0%
IMPEDANCE FACTOR                      1.00                1.00
ACTUAL CAPACITY                       1199                1157
```

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1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:12-16-1988            TIME:12:13:29
BEACH/HARRISON NO BUILD CONDITIONS: AM PEAK HOUR

STEP 2 LEFT TURNS FROM     B:HARRISON SB            A:HARRISON NB
CONFLICTING FLOWS                        1                    278
CRITICAL GAPS                          4.5                    4.5
CAPACITY                              1308                   1018
CAPACITY USED                            0%                     0%
IMPEDANCE FACTOR                      1.00                   1.00
ACTUAL CAPACITY                       1308                   1018

STEP 3 THRU MOVES FROM     C:BEACH WB               D:BEACH EB
CONFLICTING FLOWS                      279                    257
CRITICAL GAPS                          5.5                    5.0
CAPACITY                               812                    926
CAPACITY USED                            5%                     0%
IMPEDANCE FACTOR                      0.97                   1.00
ACTUAL CAPACITY                        812                    926

STEP 4 LEFT TURNS FROM     C:BEACH WB               D:BEACH EB
CONFLICTING FLOWS                      280                    297
CRITICAL GAPS                          6.0                    5.5
CAPACITY                               731                    795
ACTUAL CAPACITY                        731                    772

                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT               DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUEU


ALL MOVES FROM C:        131        756       625     A      5.76         0.21

ALL MOVES FROM D:          1       1157      1156     A      3.11         0.00
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:12-20-1988             TIME:11:10:54
BEACH/HARRISON NO-BUILD CONDITIONS: PM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=I12NBPM    GEOMETRICS=KBINT12
KEY:   D
       |
     A-'-B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
          FROM D: YIELD
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 4 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: BEACH WB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: BEACH EB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: HARRISON NB B: HARRISON SB C: BEACH WB    D: BEACH EB
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: HARRISON NB B: HARRISON SB C: BEACH WB    D: BEACH EB
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0    0    1    0  357  110  148   70    0    0    0    1
PHF               0.92           0.92           0.92           0.92
ADJ VOLUME        0    0    1    0  388  120  161   76    0    0    0    1
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR       0              0            177   84    0    0    0    1

STEP 1 RIGHT TURNS FROM     C:BEACH WB               D:BEACH EB
CONFLICTING FLOWS                        1                 254
CRITICAL GAPS                          5.0                 4.5
CAPACITY                              1199                1042
CAPACITY USED                            0%                  0%
IMPEDANCE FACTOR                      1.00                1.00
ACTUAL CAPACITY                       1199                1042
```

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1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:12-20-1988             TIME:11:10:54
BEACH/HARRISON NO-BUILD CONDITIONS: PM PEAK HOUR

STEP 2 LEFT TURNS FROM     B:HARRISON SB             A:HARRISON NB
CONFLICTING FLOWS                        1                 508
CRITICAL GAPS                          5.0                 5.0
CAPACITY                              1199                 708
CAPACITY USED                            0%                  0%
IMPEDANCE FACTOR                      1.00                1.00
ACTUAL CAPACITY                       1199                 708

STEP 3 THRU MOVES FROM     C:BEACH WB                D:BEACH EB
CONFLICTING FLOWS                      508                 449
CRITICAL GAPS                          6.0                 5.5
CAPACITY                               544                 665
CAPACITY USED                           15%                  0%
IMPEDANCE FACTOR                      0.90                1.00
ACTUAL CAPACITY                        544                 665

STEP 4 LEFT TURNS FROM     C:BEACH WB                D:BEACH EB
CONFLICTING FLOWS                      509                 525
CRITICAL GAPS                          6.5                 6.0
CAPACITY                               480                 532
ACTUAL CAPACITY                        480                 478

                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT               DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUEUE


ALL MOVES FROM C:        261        499       239     C     15.09         1.09

ALL MOVES FROM D:          1       1042      1041     A      3.46         0.00
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:12-20-1988             TIME:20:18:49
BEACH/HARRISON NO BUILD CONDITIONS: SAT PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=I12NBSAT   GEOMETRICS=KBINT12
KEY:   D
       |
     A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
          FROM D: YIELD
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 4 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: BEACH WB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: BEACH EB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: HARRISON NB B: HARRISON SB C: BEACH WB    D: BEACH EB
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: HARRISON NB B: HARRISON SB C: BEACH WB    D: BEACH EB
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0    0    1    0  271   89   82   66    0    0    0    1
PHF               0.88           0.88           0.88           0.88
ADJ VOLUME        0    0    1    0  308  101   93   75    0    0    0    1
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR       0              0            103   83    0    0    0    1

STEP 1 RIGHT TURNS FROM     C:BEACH WB               D:BEACH EB
CONFLICTING FLOWS                        1                 205
CRITICAL GAPS                          5.0                 4.5
CAPACITY                              1199                1090
CAPACITY USED                            0%                  0%
IMPEDANCE FACTOR                      1.00                1.00
ACTUAL CAPACITY                       1199                1090
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1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:12-20-1988             TIME:20:18:49
BEACH/HARRISON NO BUILD CONDITIONS: SAT PEAK HOUR

STEP 2 LEFT TURNS FROM     B:HARRISON SB            A:HARRISON NB
CONFLICTING FLOWS                        1                 409
CRITICAL GAPS                          5.0                 5.0
CAPACITY                              1199                 789
CAPACITY USED                           0%                  0%
IMPEDANCE FACTOR                      1.00                1.00
ACTUAL CAPACITY                       1199                 789


STEP 3 THRU MOVES FROM     C:BEACH WB               D:BEACH EB
CONFLICTING FLOWS                      410                 360
CRITICAL GAPS                          6.0                 5.5
CAPACITY                               619                 739
CAPACITY USED                          13%                  0%
IMPEDANCE FACTOR                      0.91                1.00
ACTUAL CAPACITY                        619                 739


STEP 4 LEFT TURNS FROM     C:BEACH WB               D:BEACH EB
CONFLICTING FLOWS                      411                 435
CRITICAL GAPS                          6.5                 6.0
CAPACITY                               553                 600
ACTUAL CAPACITY                        552                 548


                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT               DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUEUE


ALL MOVES FROM C:        185        580       395     B      9.10         0.47

ALL MOVES FROM D:          1       1090      1089     A      3.31         0.00
```

LEVEL OF SERVICE CALCULATIONS:

NO BUILD (1993) CONDITIONS -
WITH IMPROVEMENTS BY OTHERS
(AM, PM and SAT peak hours)

- Bedford/Kingston
- Bedford/Chauncy/LP Garage
- Surface Artery/Essex/Lincoln
- Essex/Kingston/Ave. DeLafayette
- Essex/Harrison/Chauncy
- Essex/Washington
  (PM only)

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
KINGSTON/BEDFORD
NO BUILD CONDITIONS: AM PEAK HOUR
date:12-20-1988             time:11:21:31
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I5NBAM     GEOMETRICS=KBINT5     SIGNAL=KBINT5
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES       # OF LANES      LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT       LT  TH   RT    WALK
EB    0    0  113     0  0  1     0.0  0.0 12.0    40
WB   77  513    0     1  1  0    12.0 12.0  0.0    40
NB    0    0    0     0  0  0     0.0  0.0  0.0     0
SB    0  176  102     0  1  0     0.0 12.0  0.0    25

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%   Y     0    0  .880  100   Y    14.0    3
WB  0.0%  2.0%   Y     0    0  .880  200   Y    14.0    3
NB  0.0%  0.0%         0    0  .000    0        10.3    0
SB  0.0%  2.0%   Y     0    0  .880  200   Y    10.3    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1        *     *  *                             *  32.7    3    A
 2           *           *                 *  *     21.3    3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0    0  113  .880     0    0  128
WB    77  513    0  .880    88  583    0
NB     0    0    0  .000     0    0    0
SB     0  176  102  .880     0  200  116

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N  LU     v  Plt  Prt
EB  RT         128 1 1.00  128 0.00 1.00
WB  LT          88 1 1.00   88 1.00 0.00
WB  TH         583 1 1.00  583 0.00 0.00
SB  TH-RT      316 1 1.00  316 0.00 0.37

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT       LT    TH   RT       LT  TH  RT    VOLUME
WESTBOUND         0    0  128       100    0    0        0   0   1       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  RT        1800  1 1.000 1.000 1.000 1.000 1.000 0.900 0.850 1.000 1377
WB  LT        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
WB  TH        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604
SB  TH-RT     1800  1 1.000 0.990 1.000 1.000 1.000 0.900 0.833 1.000 1336

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  RT        128 1377 0.09 0.55  751 0.17
WB  LT         88 1524 0.06 0.55  831 0.11
WB  TH        583 1604 0.36 0.55  875 0.67     *
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SB  TH-RT     316 1336 0.24 0.35  474 0.67     *

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.60 TOTAL V/C= 0.67

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  RT       0.17 0.55  60.0   5.20  751    0.01 0.85    4.43  A   1.0    1
WB  LT       0.11 0.55  60.0   5.00  831    0.00 1.00    5.00  B   0.7    1
WB  TH       0.67 0.55  60.0   7.41  875    1.37 0.85    7.46  B   4.4    4
SB  TH-RT    0.67 0.35  60.0  12.43  474    2.47 0.85   12.67  B   3.4    4

DIR Delay LOS
EB   4.43  A
WB   7.14  B
SB  12.67  B
INTERSECTION DELAY =  8.39 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  16.3 SECONDS
THE EXISTING TIMING IS OPTIMAL
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No Build

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
KINGSTON/BEDFORD
~~EXISTING~~ CONDITIONS: PM PEAK HOUR
date:12-16-1988            time:16:54:04
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=KBI5PM     GEOMETRICS=KBINT5     SIGNAL=KBINT5
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB    0    0  339     0  0  1     0.0  0.0 12.0    40
WB  132  368    0     1  1  0    12.0 12.0  0.0    40
NB    0    0    0     0  0  0     0.0  0.0  0.0     0
SB    0  378  170     0  1  0     0.0 12.0  0.0    25

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK              PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%   Y     0     0  .940  100   Y    14.0    3
WB  0.0%  2.0%   Y     0     0  .940  200   Y    14.0    3
NB  0.0%  0.0%         0     0  .000    0        10.3    0
SB  0.0%  2.0%   Y     0     0  .940  200   Y    10.3    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1        *     *  *                             *  20.4   3    A
 2           *           *                 *  *     33.6   3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0    0  339  .940     0    0  361
WB   132  368    0  .940   140  391    0
NB     0    0    0  .000     0    0    0
SB     0  378  170  .940     0  402  181

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP    FLOW N   LU    v  Plt  Prt
EB  RT           361 1 1.00  361 0.00 1.00
WB  LT           140 1 1.00  140 1.00 0.00
WB  TH           391 1 1.00  391 0.00 0.00
SB  TH-RT        583 1 1.00  583 0.00 0.31

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED        VOLUMES       % OPPOSING LEFT TURN      # LANES     OPPOSING
                   LT   TH   RT       LT    TH    RT        LT  TH  RT     VOLUME
WESTBOUND           0    0  361      100     0     0         0   0   1        0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP    IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  RT           1800 1 1.000 1.000 1.000 1.000 1.000 0.900 0.850 1.000 1377
WB  LT           1800 1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
WB  TH           1800 1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604
SB  TH-RT        1800 1 1.000 0.990 1.000 1.000 1.000 0.900 0.843 1.000 1353

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP       v    s  v/s  g/C     c  v/c  CRITICAL
EB  RT           361 1377 0.26 0.34   468 0.77     *
WB  LT           140 1524 0.09 0.34   518 0.27
WB  TH           391 1604 0.24 0.34   546 0.72
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SB  TH-RT     583 1353 0.43 0.56  757 0.77     *

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.69 TOTAL V/C= 0.77

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1     c      d2   PF   Delay LOS Avg Q  95% Q
EB  RT       0.77 0.34  60.0  13.45  468     5.27 0.85   15.91  C   4.0
WB  LT       0.27 0.34  60.0  10.93  518     0.07 1.00   11.01  B   1.5
WB  TH       0.72 0.34  60.0  13.13  546     3.12 0.85   13.81  B   4.3
SB  TH-RT    0.77 0.56  60.0   7.76  757     3.38 0.85    9.47  B   4.3

DIR Delay LOS
EB  15.91  C
WB  13.07  B
SB   9.47  B
INTERSECTION DELAY = 12.34 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  22.2 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
KINGSTON/BEDFORD
NO BUILD CONDITIONS: SAT PEAK HOUR
date:12-20-1988             time:20:29:13
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I5NBSAT    GEOMETRICS=KBINT5     SIGNAL=KBINT5
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB    0    0  209     0  0  1     0.0  0.0 12.0    40
WB   100 338    0     1  1  0    12.0 12.0  0.0    40
NB    0    0    0     0  0  0     0.0  0.0  0.0     0
SB    0  232  195     0  1  0     0.0 12.0  0.0    25

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS      ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%   Y     0    0  .880  100   Y    14.0    3
WB  0.0%  2.0%   Y     0    0  .880  200   Y    14.0    3
NB  0.0%  0.0%         0    0  .000    0        10.3    0
SB  0.0%  2.0%   Y     0    0  .880  200   Y    10.3    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND   SOUTHBOUND GREEN   Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1        *     *  *                             *  21.2    3    A
 2           *           *                 *  *     32.8    3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0    0  209  .880     0    0  238
WB   100  338    0  .880   114  384    0
NB     0    0    0  .000     0    0    0
SB     0  232  195  .880     0  264  222

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
EB  RT         238 1 1.00  238 0.00 1.00
WB  LT         114 1 1.00  114 1.00 0.00
WB  TH         384 1 1.00  384 0.00 0.00
SB  TH-RT      485 1 1.00  485 0.00 0.46

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT    VOLUME
WESTBOUND         0    0  238       100    0    0        0   0   1       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  RT        1800  1 1.000 1.000 1.000 1.000 1.000 0.900 0.850 1.000 1377
WB  LT        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
WB  TH        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604
SB  TH-RT     1800  1 1.000 0.990 1.000 1.000 1.000 0.900 0.817 1.000 1310

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  RT        238 1377 0.17 0.35  487 0.49
WB  LT        114 1524 0.07 0.35  538 0.21
WB  TH        384 1604 0.24 0.35  567 0.68     *
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SB  TH-RT     485 1310 0.37 0.55  716 0.68     *

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.61 TOTAL V/C= 0.68

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c g/C    C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  RT       0.49 0.35  60.0  11.52  487    0.64 0.85   10.33  B   2.6    3
WB  LT       0.21 0.35  60.0  10.30  538    0.03 1.00   10.33  B   1.2    2
WB  TH       0.68 0.35  60.0  12.54  567    2.26 0.85   12.58  B   4.1    5
SB  TH-RT    0.68 0.55  60.0   7.44  716    1.80 0.85    7.86  B   3.7    4

DIR Delay LOS
EB  10.33  B
WB  12.06  B
SB   7.86  B
INTERSECTION DELAY = 10.06 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  16.8 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
BEDFORD/CHAUNCY/LP GARAGE
NO-BUILD CONDITIONS: AM PEAK HOUR
date:12-20-1988             time:11:46:18
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I6NBAM     GEOMETRICS=KBINT6     SIGNAL=KBINT6
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH    RT    LT TH RT      LT   TH    RT    WALK
EB   12   45   13     0  1  0     0.0 14.0  0.0    20
WB  318  229   57     0  1  0     0.0 14.0  0.0    32
NB  103  142   68     0  1  0     0.0 14.0  0.0    32
SB    0    0    0     0  0  0     0.0  0.0  0.0     0

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%   N     0    0   .920  100   N    11.0    3
WB  0.0%  2.0%   N     0    0   .920  300   N    11.0    3
NB  0.0%  2.0%   N     0    0   .920  100   N    11.0    3
SB  0.0%  0.0%         0    0   .000  100   N    11.0    0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *     *  *  *              *           *  32.4   4    A
 2           *           *  *  *  *                 19.6   4    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     12   45   13  .920    13   49   14
WB    318  229   57  .920   346  249   62
NB    103  142   68  .920   112  154   74
SB      0    0    0  .000     0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N   LU     v  Plt  Prt
EB  LT-TH-RT     76 1 1.00   76 0.17 0.19
WB  LT-TH-RT    657 1 1.00  657 0.53 0.09
NB  LT-TH-RT    340 1 1.00  340 0.33 0.22

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT         LT   TH   RT        LT  TH  RT     VOLUME
EASTBOUND       346  249   62        100  100  100        0   1   0     311
WESTBOUND        13   49   14        100  100  100        0   1   0      63
NORTHBOUND        0    0    0          0    0    0        0   0   0       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt     s
EB  LT-TH-RT  1800  1 1.067 1.000 1.000 1.000 1.000 0.900 0.866 0.920 1377
WB  LT-TH-RT  1800  1 1.067 0.990 1.000 1.000 1.000 0.900 0.883 0.930 1404
NB  LT-TH-RT  1800  1 1.067 0.990 1.000 1.000 1.000 0.900 0.840 0.840 1207

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G   N   Va   Vm  Vlt  Plt No   Vo Plto
EB  60  32  1   76   63   13 0.17  1  311 0.53
WB  60  32  1  657  311  346 0.53  1   63 0.17
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CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
EB 1522 0.204 25.354 0.681 0.171  7.075 0.829  4.696    1.653 0.920 0.920
WB 1619 0.039 31.312 0.836 0.526  1.117 0.474  0.614    1.346 0.930 0.930

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH-RT   76 1377 0.06 0.54   744 0.10
WB  LT-TH-RT  657 1404 0.47 0.54   759 0.87      *
NB  LT-TH-RT  340 1207 0.28 0.33   394 0.86      *

CYCLE= 60.0  LOST= 8.0  SUM V/S CRIT= 0.75 TOTAL V/C= 0.86

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP v/c  g/C    C      d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.10 0.54  60.0   5.10  744    0.00 0.85    4.33  A    0.6    1
WB  LT-TH-RT 0.87 0.54  60.0   9.04  759    7.25 0.85   13.85  B    5.0    8
NB  LT-TH-RT 0.86 0.33  60.0  14.42  394   12.38 0.85   22.78  C    4.1    7

DIR Delay LOS
EB   4.33  A
WB  13.85  B
NB  22.78  C
INTERSECTION DELAY = 16.00 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  37.9 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
BEDFORD/CHAUNCY/LP GARAGE
NO-BUILD CONDITIONS: PM PEAK HOUR
date:12-20-1988             time:11:49:54
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I6NBPM     GEOMETRICS=KBINT6     SIGNAL=KBINT6
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES     # OF LANES      LANE WIDTH     CROSS
DIR  LT   TH  RT     LT TH RT      LT   TH   RT    WALK
EB   74  286  108     0  1  0     0.0 14.0  0.0    20
WB  316  167   54     0  1  0     0.0 14.0  0.0    32
NB   74  168   53     0  1  0     0.0 14.0  0.0    32
SB    0    0    0     0  0  0     0.0  0.0  0.0     0

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%   N     0    0   .920  100   N    11.0    3
WB  0.0%  2.0%   N     0    0   .920  300   N    11.0    3
NB  0.0%  2.0%   N     0    0   .920  100   N    11.0    3
SB  0.0%  0.0%         0    0   .000  100   N    11.0    0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *     *  *  *              *           *  63.4    4    A
 2           *           *  *  *  *                 26.1    4    A

CYCLE=  97.5

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB    74  286  108  .920    80  311  117
WB   316  167   54  .920   343  182   59
NB    74  168   53  .920    80  183   58
SB     0    0    0  .000     0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v Plt  Prt
EB  LT-TH-RT   509 1 1.00  509 0.16 0.23
WB  LT-TH-RT   584 1 1.00  584 0.59 0.10
NB  LT-TH-RT   321 1 1.00  321 0.25 0.18

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT  TH    RT        LT   TH   RT        LT TH  RT    VOLUME
EASTBOUND       343  182   59       100  100  100        0   1   0     240
WESTBOUND        80  311  117       100  100  100        0   1   0     428
NORTHBOUND        0    0    0         0    0    0        0   0   0        0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  LT-TH-RT  1800  1 1.067 1.000 1.000 1.000 1.000 0.900 0.858 0.920 1363
WB  LT-TH-RT  1800  1 1.067 0.990 1.000 1.000 1.000 0.900 0.882 0.613  925
NB  LT-TH-RT  1800  1 1.067 0.990 1.000 1.000 1.000 0.900 0.850 0.854 1242

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C  G   N  Va    Vm  Vlt  Plt No   Vo Plto
EB  98  63  1  509  428   80 0.16  1  240 0.59
WB  98  63  1  584  240  343 0.59  1  428 0.16
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CALCULATIONS
DIR Sop    Yo      Gu     Fs     Pl      Gq     Pt      Gf       El     Fm   Flt
EB 1199 0.200 54.846 0.725 0.158  8.547 0.842  5.546    1.552 0.920 0.920
WB 1656 0.259 51.492 0.607 0.588 11.902 0.412  1.392    1.852 0.613 0.613

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C     c  v/c  CRITICAL
EB  LT-TH-RT  509 1363 0.37 0.65  886 0.57
WB  LT-TH-RT  584  925 0.63 0.65  601 0.97     *
NB  LT-TH-RT  321 1242 0.26 0.27  333 0.96     *

CYCLE= 97.5  LOST= 8.0  SUM V/S CRIT= 0.89 TOTAL V/C= 0.97

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.57 0.65  97.5   7.23  886    0.68 0.85    6.73  B   4.8      5
WB  LT-TH-RT 0.97 0.65  97.5  12.30  601   21.89 0.85   29.06  D   7.5     15
NB  LT-TH-RT 0.96 0.27  97.5  26.78  333   29.30 0.85   47.66  E   7.4     14

DIR Delay LOS
EB   6.73  B
WB  29.06  D
NB  47.66  E
INTERSECTION DELAY = 25.24 INTERSECTION LOS=D

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  97.5 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 125.4 SECONDS
for chosen cycle length  97.5
suggested timing phase 1 is  63.5 secs green,   4.0 secs yellow + red clear
suggested timing phase 2 is  26.0 secs green,   4.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
BEDFORD/CHAUNCY/LP GARAGE
NO BUILD CONDITIONS: SAT PEAK HOUR
date:12-20-1988             time:20:24:02
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I6NBSAT    GEOMETRICS=KBINT6     SIGNAL=KBINT6
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES        # OF LANES      LANE WIDTH      CROSS
DIR  LT    TH    RT    LT  TH RT      LT    TH    RT    WALK
EB    33   116    32     0  1  0      0.0 14.0   0.0     20
WB   327   116    96     0  1  0      0.0 14.0   0.0     32
NB    64   134    93     0  1  0      0.0 14.0   0.0     32
SB     0     0     0     0  0  0      0.0  0.0   0.0      0

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                 PEDESTRIANS        ARR
DIR GRADE  %HV   Y/N MOVES BUSES   PHF  CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%    N     0     0   .920  100    N     11.0    3
WB  0.0%  2.0%    N     0     0   .920  300    N     11.0    3
NB  0.0%  2.0%    N     0     0   .920  100    N     11.0    3
SB  0.0%  0.0%          0     0   .000  100    N     11.0    0

PHASINGS
  . EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN   Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *     *  *  *              *           *  33.5   4    A
 2           *           *  *  *  *                 18.5   4    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR   LTV   THV  RTV    PHF   LTFR THFR RTFR
EB     33   116   32   .920     36  126   35
WB    327   116   96   .920    355  126  104
NB     64   134   93   .920     70  146  101
SB      0     0    0   .000      0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N   LU     v  Plt  Prt
EB  LT-TH-RT    197 1 1.00   197 0.18 0.18
WB  LT-TH-RT    586 1 1.00   586 0.61 0.18
NB  LT-TH-RT    316 1 1.00   316 0.22 0.32

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED        VOLUMES       % OPPOSING LEFT TURN     # LANES      OPPOSING
                  LT   TH   RT          LT   TH    RT       LT  TH  RT     VOLUME
EASTBOUND        355  126  104         100  100   100        0   1   0       230
WESTBOUND         36  126   35         100  100   100        0   1   0       161
NORTHBOUND         0    0    0           0    0     0        0   0   0         0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP   IDEAL N  Fwid    Fhv    Fgr  Fpark  Fbus  Farea   Frt    Flt     s
EB  LT-TH-RT   1800  1 1.067 1.000 1.000 1.000 1.000 0.900 0.868 0.949 1423
WB  LT-TH-RT   1800  1 1.067 0.990 1.000 1.000 1.000 0.900 0.867 0.842 1249
NB  LT-TH-RT   1800  1 1.067 0.990 1.000 1.000 1.000 0.900 0.811 0.860 1193

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va    Vm   Vlt  Plt No   Vo Plto
EB  60  34  1  197   161    36 0.18  1  230 0.61
WB  60  34  1  586   230   355 0.61  1  161 0.18
```

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CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
EB 1412 0.163 28.367 0.731 0.182  5.162 0.818  3.634    1.539 0.949 0.949
WB 1639 0.098 30.648 0.774 0.607  2.881 0.393  0.959    1.453 0.842 0.842

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH-RT  197 1423 0.14 0.56  795 0.25
WB  LT-TH-RT  586 1249 0.47 0.56  698 0.84     *
NB  LT-TH-RT  316 1193 0.27 0.31  367 0.86     *

CYCLE= 60.0  LOST= 8.0  SUM V/S CRIT= 0.73 TOTAL V/C= 0.85

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.25 0.56  60.0   5.15  795    0.03 0.85    4.41  A   1.4    1
WB  LT-TH-RT 0.84 0.56  60.0   8.36  698    6.29 0.85   12.45  B   4.3    7
NB  LT-TH-RT 0.86 0.31  60.0  14.86  367   12.74 0.85   23.46  C   3.9    7

DIR Delay LOS
EB   4.41  A
WB  12.45  B
NB  23.46  C
INTERSECTION DELAY = 14.18 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  35.2 SECONDS
for chosen cycle length  60.0
suggested timing phase 1 is  33.2 secs green,   4.0 secs yellow + red clear
suggested timing phase 2 is  18.8 secs green,   4.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/SURFACE ARTERY/LINCOLN STREETS
NO BUILD CONDITIONS (W/MITIGATION): AM PEAK HOUR
date:01-08-1989             time:13:54:25
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I7NBAM     GEOMETRICS=KBINT7MA   SIGNAL=KBINT7MP
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES       # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT     LT TH RT      LT   TH   RT    WALK
EB  159  587  155      1  2  1    12.0 12.0 15.0    52
WB   54 1069   21      0  3  0     0.0 12.0  0.0    30
NB   43  530   13      0  3  0     0.0 11.0  0.0    56
SB   80  770   51      0  3  1     0.0 11.0 15.0    66

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                 PEDESTRIANS        ARR
DIR GRADE %HV    Y/N MOVES BUSES   PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%    N      0    10  .870   30   Y    12.0     3
WB  0.0%  2.0%    Y     10    10  .870  200   Y    12.0     3
NB  0.0%  2.0%    N      0    20  .870   90   Y    15.5     3
SB  0.0%  2.0%    N      0    25  .870  380   Y    15.5     3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *                          *           *  21.7   4    A
 2           *           *  *  *  *     *  *  *     20.1   4    A
 3           *           *              *  *  *      0.1   0    A
 4        *     *  *  *              *           *  32.0   4    A

CYCLE=  90.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR   LTV  THV  RTV   PHF  LTFR THFR RTFR
EB    159  587  155  .870   183  675  178
WB     54 1069   21  .870    62 1229   24
NB     43  530   13  .870    49  609   15
SB     80  770   51  .870    92  885   59

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N   LU    v  Plt  Prt
EB  LT          183 1 1.00  183 1.00 0.00
EB  TH          675 2 1.05  708 0.00 0.00
EB  RT          178 1 1.00  178 0.00 1.00
WB  LT-TH-RT   1315 3 1.10 1446 0.05 0.02
NB  LT-TH-RT    674 3 1.10  741 0.07 0.02
SB  LT-TH       977 3 1.10 1075 0.09 0.00
SB  RT           59 1 1.00   59 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                  OPPOSING APPROACH
BEING OPPOSED         VOLUMES        % OPPOSING LEFT TURN      # LANES       OPPOSING
                   LT    TH    RT        LT    TH    RT       LT  TH  RT      VOLUME
EASTBOUND          62  1229    24         0     0     0        0   3   0          0
WESTBOUND         183   675   178         0     0     0        1   2   1          0
NORTHBOUND         92   885    59        83    83     0        0   3   1        811
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SOUTHBOUND          49  609   15        100  100  100        0   3   0     674

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP    IDEAL N  Fwid    Fhv    Fgr Fpark  Fbus Farea    Frt    Flt     s
EB  LT           1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
EB  TH           1800  2 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3208
EB  RT           1800  1 1.100 0.990 1.000 1.000 0.958 0.900 0.807 1.000 1365
WB  LT-TH-RT     1800  3 1.000 0.990 1.000 0.950 0.986 0.900 0.994 0.991 4438
NB  LT-TH-RT     1800  3 0.967 0.990 1.000 1.000 0.972 0.900 0.995 0.793 3567
SB  LT-TH        1800  3 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.936 4354
SB  RT           1800  1 1.100 0.990 1.000 1.000 0.896 0.900 0.836 1.000 1321

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va    Vm  Vlt  Plt No   Vo Plto
NB  90  20  3  674  674   49 0.07  3  811 0.09
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf        El    Fm   Flt
NB 4741 0.171  5.723 0.368 0.521 14.420 0.479  1.831    3.057 0.379 0.793

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v     s  v/s  g/C     c  v/c  CRITICAL
EB  LT          183 1524 0.12 0.24   367 0.50
EB  TH          708 3208 0.22 0.24   774 0.92      *
EB  RT          178 1365 0.13 0.64   876 0.20
WB  LT-TH-RT   1446 4438 0.33 0.36  1580 0.92      *
NB  LT-TH-RT    741 3567 0.21 0.22   798 0.93
SB  LT-TH      1075 4354 0.25 0.27  1174 0.92      *
SB  RT           59 1321 0.04 0.27   356 0.16

CYCLE= 90.0  LOST=12.0  SUM V/S CRIT= 0.79 TOTAL V/C= 0.92

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C      d1     c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT        0.50 0.24  90.0  22.38   367    0.90 1.00   23.28  C    3.5     4
EB  TH        0.92 0.24  90.0  25.27   774   11.18 0.85   30.99  D   12.8    18
EB  RT        0.20 0.64  90.0   5.05   876    0.02 0.85    4.31  A    1.6     2
WB  LT-TH-RT  0.92 0.36  90.0  21.05  1580    6.34 0.85   23.28  C   21.2    26
NB  LT-TH-RT  0.93 0.22  90.0  26.01   798   12.27 0.85   32.53  D   13.1    19
SB  LT-TH     0.92 0.27  90.0  24.23  1174    8.08 0.85   27.46  D   17.8    23
SB  RT        0.16 0.27  90.0  19.09   356    0.02 0.85   16.25  C    1.1     1

DIR Delay LOS
EB  25.23  D
WB  23.28  C
NB  32.53  D
SB  26.88  D
INTERSECTION DELAY = 26.24 INTERSECTION LOS=D

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  75.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  72.9 SECONDS
for chosen cycle length  75.0
suggested timing phase 1 is  17.5 secs green,   4.0 secs yellow + red clear
suggested timing phase 2 is  15.7 secs green,   4.0 secs yellow + red clear
suggested timing phase 3 is   0.0 secs green,  -0.1 secs yellow + red clear
suggested timing phase 4 is  25.9 secs green,   4.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/SURFACE ARTERY/LINCOLN STREETS
NO BUILD CONDITIONS (W/MITIGATION): PM PEAK HOUR
date:01-08-1989             time:13:43:25
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I7NBPM     GEOMETRICS=KBINT7MP   SIGNAL=KBINT7MP
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT     LT TH RT      LT   TH   RT     WALK
EB  148  811  628    1  2  1    12.0 12.0 15.0    52
WB   37  503   13    0  2  0     0.0 12.0  0.0    30
NB   40  733   14    0  3  0     0.0 11.0  0.0    56
SB   38 1299   16    0  3  1     0.0 11.0 15.0    66

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF  CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0   10   .940   15   Y    12.0    3
WB  0.0%  2.0%   Y    10   10   .940  180   Y    12.0    3
NB  0.0%  2.0%   N     0   20   .940  100   Y    15.5    3
SB  0.0%  2.0%   N     0   25   .940  310   Y    15.5    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *                          *           *  29.4    4    A
 2           *           *  *  *  *     *  *  *     30.1    4    A
 3           *           *              *  *  *      1.9    4    A
 4        *     *  *  *              *           *  22.6    4    A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB   148  811  628  .940   157  863  668
WB    37  503   13  .940    39  535   14
NB    40  733   14  .940    43  780   15
SB    38 1299   16  .940    40 1382   17

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
EB  LT         157 1 1.00  157 1.00 0.00
EB  TH         863 2 1.05  906 0.00 0.00
EB  RT         668 1 1.00  668 0.00 1.00
WB  LT-TH-RT   588 2 1.05  618 0.07 0.02
NB  LT-TH-RT   837 3 1.10  921 0.05 0.02
SB  LT-TH     1422 3 1.10 1565 0.03 0.00
SB  RT          17 1 1.00   17 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT    VOLUME
EASTBOUND        39  535   14         0    0    0        0   2   0       0
WESTBOUND       157  863  668         0    0    0        1   2   1       0
NORTHBOUND       40 1382   17        84   84    0        0   3   1    1189
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SOUTHBOUND       43  780   15        100  100  100        0   3   0     837

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt     s
EB  LT        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
EB  TH        1800  2 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3208
EB  RT        1800  1 1.100 0.990 1.000 1.000 0.958 0.900 0.802 1.000 1357
WB  LT-TH-RT  1800  2 1.000 0.990 1.000 0.925 0.979 0.900 0.993 0.987 2845
NB  LT-TH-RT  1800  3 0.967 0.990 1.000 1.000 0.972 0.900 0.996 0.735 3310
SB  LT-TH     1800  3 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.971 4515
SB  RT        1800  1 1.100 0.990 1.000 1.000 0.896 0.900 0.843 1.000 1332

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
NB 100  30  3  837  837    43 0.05  3 1189 0.03
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
NB 5082 0.234  8.796 0.132 0.592 21.337 0.408  1.378    8.532 0.205 0.735

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s v/s  g/C    c v/c  CRITICAL
EB  LT         157 1524 0.10 0.29  448 0.35
EB  TH         906 3208 0.28 0.29  942 0.96     *
EB  RT         668 1357 0.49 0.56  759 0.88
WB  LT-TH-RT   618 2845 0.22 0.23  643 0.96     *
NB  LT-TH-RT   921 3310 0.28 0.30  997 0.92
SB  LT-TH     1565 4515 0.35 0.36 1627 0.96     *
SB  RT          17 1332 0.01 0.36  480 0.04

CYCLE=100.0  LOST=12.0  SUM V/S CRIT= 0.85 TOTAL V/C= 0.96

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1     c      d2   PF    Delay LOS Avg Q   95% Q
EB  LT       0.35 0.29 100.0  21.14  448    0.21 1.00   21.34  C   3.1    4
EB  TH       0.96 0.29 100.0  26.41  942   15.17 0.85   35.34  D  16.9   26
EB  RT       0.88 0.56 100.0  14.52  759    8.25 0.85   19.35  C   8.2   12
WB  LT-TH-RT 0.96 0.23 100.0  29.09  643   19.32 0.85   41.15  E  13.1   21
NB  LT-TH-RT 0.92 0.30 100.0  25.70  997    9.92 0.85   30.27  D  16.2   22
SB  LT-TH    0.96 0.36 100.0  23.78 1627   10.55 0.85   29.19  D  25.3   36
SB  RT       0.04 0.36 100.0  15.74  480    0.00 0.85   13.38  B   0.3    1

DIR Delay LOS
EB  27.90  D
WB  41.15  E
NB  30.27  D
SB  29.02  D
INTERSECTION DELAY = 30.40 INTERSECTION LOS=D

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 109.6 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is  29.4 secs green,   4.0 secs yellow + red clear
suggested timing phase 2 is  30.5 secs green,   4.0 secs yellow + red clear
suggested timing phase 3 is   1.6 secs green,   4.0 secs yellow + red clear
suggested timing phase 4 is  22.6 secs green,   4.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/SURFACE ARTERY/LINCOLN STREETS
NO BUILD CONDITIONS (W/MITIGATION): SAT PEAK HOUR
date:01-08-1989             time:14:01:29
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I7NBSAT    GEOMETRICS=KBINT7MP   SIGNAL=KBINT7MP
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES       # OF LANES     LANE WIDTH      CROSS
DIR  LT   TH   RT     LT TH RT       LT    TH    RT     WALK
EB   47  575  401      1  2  1     12.0  12.0  15.0     52
WB   27  373    3      0  2  0      0.0  12.0   0.0     30
NB   70  486    2      0  3  0      0.0  11.0   0.0     56
SB   22  666   20      0  3  1      0.0  11.0  15.0     66

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                 PEDESTRIANS       ARR
DIR GRADE %HV    Y/N MOVES BUSES   PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%    N      0     0   .790    30   Y     12.0     3
WB  0.0%  2.0%    Y     10     0   .790    50   Y     12.0     3
NB  0.0%  2.0%    N      0     0   .790    50   Y     15.5     3
SB  0.0%  2.0%    N      0    10   .790   200   Y     15.5     3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *                          *           *  18.1   4     A
 2           *           *  *  *  *     *  *  *     11.9   4     A
 3           *           *              *  *  *      0.1   0     A
 4        *     *  *  *              *           *  13.9   4     A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB    47  575  401  .790    59  728  508
WB    27  373    3  .790    34  472    4
NB    70  486    2  .790    89  615    3
SB    22  666   20  .790    28  843   25

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
EB  LT          59 1 1.00   59 1.00 0.00
EB  TH         728 2 1.05  764 0.00 0.00
EB  RT         508 1 1.00  508 0.00 1.00
WB  LT-TH-RT   510 2 1.05  536 0.07 0.01
NB  LT-TH-RT   706 3 1.10  777 0.13 0.00
SB  LT-TH      871 3 1.10  958 0.03 0.00
SB  RT          25 1 1.00   25 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                 OPPOSING APPROACH
BEING OPPOSED         VOLUMES        % OPPOSING LEFT TURN      # LANES       OPPOSING
                  LT   TH   RT         LT    TH    RT         LT  TH  RT      VOLUME
EASTBOUND         34  472    4          0     0     0          0   2   0           0
WESTBOUND         59  728  508          0     0     0          1   2   1           0
NORTHBOUND        28  843   25         75    75     0          0   3   1         649
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SOUTHBOUND         89  615    3         100  100  100          0   3   0     706

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP    IDEAL N  Fwid    Fhv    Fgr  Fpark  Fbus  Farea    Frt    Flt     s
EB  LT          1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
EB  TH          1800  2 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3208
EB  RT          1800  1 1.100 0.990 1.000 1.000 1.000 0.900 0.826 1.000 1458
WB  LT-TH-RT    1800  2 1.000 0.990 1.000 0.925 1.000 0.900 0.998 0.988 2926
NB  LT-TH-RT    1800  3 0.967 0.990 1.000 1.000 1.000 0.900 0.999 0.873 4057
SB  LT-TH       1800  3 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.976 4538
SB  RT          1800  1 1.100 0.990 1.000 1.000 0.958 0.900 0.836 1.000 1413

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va    Vm   Vlt  Plt No   Vo Plto
NB  60  12  3  706  706   89 0.13  3  649 0.03
CALCULATIONS
DIR Sop    Yo     Gu     Fs     Pl     Gq    Pt     Gf        El     Fm    Flt
NB 5138 0.126  4.991 0.469 0.563  6.948 0.437  1.464     2.397 0.618 0.873

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v     s  v/s  g/C     c  v/c  CRITICAL
EB  LT          59 1524 0.04 0.30   459 0.13
EB  TH         764 3208 0.24 0.30   967 0.79     *
EB  RT         508 1458 0.35 0.60   874 0.58
WB  LT-TH-RT   536 2926 0.18 0.23   678 0.79     *
NB  LT-TH-RT   777 4057 0.19 0.20   807 0.96
SB  LT-TH      958 4538 0.21 0.27  1212 0.79     *
SB  RT          25 1413 0.02 0.27   377 0.07

CYCLE= 60.0  LOST=12.0  SUM V/S CRIT= 0.63 TOTAL V/C= 0.79

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C      d1    c      d2    PF    Delay LOS Avg Q  95% Q
EB  LT        0.13 0.30  60.0  11.58  459    0.01 1.00   11.59  B    0.7     1
EB  TH        0.79 0.30  60.0  14.61  967    3.16 0.85   15.10  C    8.5    10
EB  RT        0.58 0.60  60.0   5.61  874    0.73 0.85    5.39  B    3.4     3
WB  LT-TH-RT  0.79 0.23  60.0  16.48  678    4.39 0.85   17.74  C    6.5     8
NB  LT-TH-RT  0.96 0.20  60.0  18.09  807   16.90 0.85   29.75  D   10.6    18
SB  LT-TH     0.79 0.27  60.0  15.53 1212    2.55 0.85   15.36  C   10.6    12
SB  RT        0.07 0.27  60.0  12.47  377    0.00 0.85   10.60  B    0.3     1

DIR Delay LOS
EB  11.24  B
WB  17.74  C
NB  29.75  D
SB  15.24  C
INTERSECTION DELAY = 17.25 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  35.9 SECONDS
for chosen cycle length  60.0
suggested timing phase 1 is  18.1 secs green,   4.0 secs yellow + red clear
suggested timing phase 2 is  13.3 secs green,   4.0 secs yellow + red clear
suggested timing phase 3 is   0.0 secs green,  -1.3 secs yellow + red clear
suggested timing phase 4 is  13.9 secs green,   4.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
KINGSTON/ESSEX/AVE DE LAFAYETTE
NO-BUILD CONDITIONS: AM PEAK HOUR
date:12-20-1988             time:11:25:17
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I9NBAM     GEOMETRICS=KBINT9A    SIGNAL=KBINT9
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB    0  705   44     0  2  1     0.0  9.0  8.0    35
WB    0    0    0     0  0  0     0.0  0.0  0.0    35
NB    0    0    0     0  0  0     0.0  0.0  0.0    33
SB  233   98    0     1  1  0    12.0 12.0  0.0    35

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS       ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%   N     0    0   .940  100   Y    15.8    3
WB  0.0%  0.0%   N     0    0   .000  100   Y    15.8    0
NB  0.0%  0.0%   N     0    0   .000  100   Y    12.8    0
SB  0.0%  0.0%   N     0    0   .940  100   Y    12.8    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1     *  *                          *           *  33.8   3    A
 2           *                          *  *        20.2   3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB      0  705   44  .940     0  750   47
WB      0    0    0  .000     0    0    0
NB      0    0    0  .000     0    0    0
SB    233   98    0  .940   248  104    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
EB  TH         750 2 1.05  787 0.00 0.00
EB  RT          47 1 1.00   47 0.00 1.00
SB  LT         248 1 1.00  248 1.00 0.00
SB  TH         104 1 1.00  104 0.00 0.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES       % OPPOSING LEFT TURN   # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT        LT  TH  RT     VOLUME
SOUTHBOUND        0    0    0         0    0    0         0   0   0        0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  TH        1800  2 0.900 1.000 1.000 1.000 1.000 0.900 1.000 1.000 2916
EB  RT        1800  1 0.867 1.000 1.000 1.000 1.000 0.900 0.802 1.000 1127
SB  LT        1800  1 1.000 1.000 1.000 1.000 1.000 0.900 1.000 0.950 1539
SB  TH        1800  1 1.000 1.000 1.000 1.000 1.000 0.900 1.000 1.000 1620

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP   v    s  v/s  g/C    c  v/c  CRITICAL
EB  TH       787 2916 0.27 0.56 1644 0.48     *
EB  RT        47 1127 0.04 0.56  635 0.07
SB  LT       248 1539 0.16 0.34  517 0.48     *
SB  TH         104 1620 0.06 0.34  545 0.19

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.43 TOTAL V/C= 0.48

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH       0.48 0.56  60.0   5.94 1644   0.18 0.85   5.20  B   5.5     5
EB  RT       0.07 0.56  60.0   4.53  635   0.00 0.85   3.85  A   0.3     1
SB  LT       0.48 0.34  60.0  11.97  517   0.56 1.00  12.53  B   2.7     3
SB  TH       0.19 0.34  60.0  10.74  545   0.02 0.85   9.14  B   1.2     1

DIR Delay LOS
EB   5.13  B
SB  11.53  B
INTERSECTION DELAY =  7.03 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  11.0 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
KINGSTON/ESSEX/AVE DE LAFAYETTE
NO BUILD CONDITIONS: PM PEAK HOUR
date:12-20-1988             time:11:28:54
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I9NBPM     GEOMETRICS=KBINT9P    SIGNAL=KBINT9
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB    0 1082  135     0  3  1     0.0  9.0  8.0    35
WB    0    0    0     0  0  0     0.0  0.0  0.0    35
NB    0    0    0     0  0  0     0.0  0.0  0.0    33
SB  515  364    0     1  1  0    12.0 12.0  0.0    35

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%   N     0    0   .960  100   Y    15.8    3
WB  0.0%  0.0%   N     0    0   .000  100   Y    15.8    0
NB  0.0%  0.0%   N     0    0   .000  100   Y    12.8    0
SB  0.0%  0.0%   N     0    0   .960  100   Y    12.8    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1     *  *                          *           *  24.2   3    A
 2           *                          *  *        29.8   3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB      0 1082  135  .960     0 1127  141
WB      0    0    0  .000     0    0    0
NB      0    0    0  .000     0    0    0
SB    515  364    0  .960   536  379    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
EB  TH        1127 3 1.10 1240 0.00 0.00
EB  RT         141 1 1.00  141 0.00 1.00
SB  LT         536 1 1.00  536 1.00 0.00
SB  TH         379 1 1.00  379 0.00 0.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT     VOLUME
SOUTHBOUND        0    0    0         0    0    0        0   0   0          0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  TH        1800  3 0.900 1.000 1.000 1.000 1.000 0.900 1.000 1.000 4374
EB  RT        1800  1 0.867 1.000 1.000 1.000 1.000 0.900 0.802 1.000 1127
SB  LT        1800  1 1.000 1.000 1.000 1.000 1.000 0.900 1.000 0.950 1539
SB  TH        1800  1 1.000 1.000 1.000 1.000 1.000 0.900 1.000 1.000 1620

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  TH       1240 4374 0.28 0.40 1765 0.70     *
EB  RT        141 1127 0.12 0.40  455 0.31
SB  LT        536 1539 0.35 0.50  764 0.70     *
SB  TH          379 1620 0.23 0.50  804 0.47

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.63 TOTAL V/C= 0.70

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH       0.70 0.40  60.0  11.32 1765    0.90 0.85  10.38  B  11.2    11
EB  RT       0.31 0.40  60.0   9.27  455    0.13 0.85   7.99  B   1.4     2
SB  LT       0.70 0.50  60.0   8.88  764    2.03 1.00  10.90  B   4.5     6
SB  TH       0.47 0.50  60.0   7.55  804    0.34 0.85   6.71  B   3.2     3

DIR Delay LOS
EB  10.14  B
SB   9.17  B
INTERSECTION DELAY =  9.75 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  17.9 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
KINGSTON/ESSEX/AVE DE LAFAYETTE
NO BUILD CONDITIONS: SAT PEAK HOUR
date:12-20-1988             time:19:51:14
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I9NBSAT    GEOMETRICS=KBINT9A    SIGNAL=KBINT9
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT       LT   TH   RT    WALK
EB    0  729   91     0  2  1     0.0  9.0  8.0    35
WB    0    0    0     0  0  0     0.0  0.0  0.0    35
NB    0    0    0     0  0  0     0.0  0.0  0.0    33
SB  301  172    0     1  1  0    12.0 12.0  0.0    35

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%   N     0    0   .940  100   Y    15.8    3
WB  0.0%  0.0%   N     0    0   .000  100   Y    15.8    0
NB  0.0%  0.0%   N     0    0   .000   50   Y    12.8    0
SB  0.0%  0.0%   N     0    0   .940  100   Y    12.8    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1     *  *                          *           *  30.9   3    A
 2           *                          *  *        23.1   3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0  729   91  .940     0  776    97
WB     0    0    0  .000     0    0     0
NB     0    0    0  .000     0    0     0
SB   301  172    0  .940   320  183     0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N  LU     v Plt  Prt
EB  TH         776 2 1.05  814 0.00 0.00
EB  RT          97 1 1.00   97 0.00 1.00
SB  LT         320 1 1.00  320 1.00 0.00
SB  TH         183 1 1.00  183 0.00 0.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT    VOLUME
SOUTHBOUND        0    0    0         0    0    0        0   0   0       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt     s
EB  TH        1800  2 0.900 1.000 1.000 1.000 1.000 0.900 1.000 1.000 2916
EB  RT        1800  1 0.867 1.000 1.000 1.000 1.000 0.900 0.826 1.000 1160
SB  LT        1800  1 1.000 1.000 1.000 1.000 1.000 0.900 1.000 0.950 1539
SB  TH        1800  1 1.000 1.000 1.000 1.000 1.000 0.900 1.000 1.000 1620

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v    s  v/s  g/C    c  v/c   CRITICAL
EB  TH         814 2916 0.28 0.52 1504 0.54     *
EB  RT          97 1160 0.08 0.52  598 0.16
SB  LT         320 1539 0.21 0.38  591 0.54     *
SB  TH        183 1620 0.11 0.38  623 0.29

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.49 TOTAL V/C= 0.54

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH       0.54 0.52  60.0   7.42 1504    0.32 0.85    6.57  B   6.3    6
EB  RT       0.16 0.52  60.0   5.83  598    0.01 0.85    4.97  A   0.8    1
SB  LT       0.54 0.38  60.0  10.92  591    0.80 1.00   11.71  B   3.3    4
SB  TH       0.29 0.38  60.0   9.74  623    0.08 0.85    8.35  B   1.9    2

DIR Delay LOS
EB   6.40  B
SB  10.49  B
INTERSECTION DELAY =  7.86 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  12.3 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/HARRISON
NO BUILD CONDITIONS: AM PEAK HOUR
date:12-19-1988             time:17:18:29
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I10NBPM    GEOMETRICS=KBINT10    SIGNAL=KBINT10A
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES       # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB  446  698  170     0  2  0     0.0  9.0  0.0    36
WB    0    0    0     0  0  0     0.0  0.0  0.0    34
NB    0    0    0     0  0  0     0.0  0.0  0.0    58
SB   60   76    0     1  1  0     9.0 11.0  0.0    29

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%   Y     0    0   .910  100   Y    16.0    3
WB  0.0%  0.0%   N     0    0   .000  100   Y    16.0    0
NB  0.0%  0.0%   N     0    0   .000  100   Y    21.5    0
SB  0.0%  0.0%   N     0    0   .910  100   Y    21.5    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *                                         49.1   3    A
 2                                      *  *         4.9   3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB   446  698  170  .910   490  767  187
WB     0    0    0  .000     0    0    0
NB     0    0    0  .000     0    0    0
SB    60   76    0  .910    66   84    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
EB  LT-TH-RT  1444 2 1.05 1516 0.34 0.13
SB  LT          66 1 1.00   66 1.00 0.00
SB  TH          84 1 1.00   84 0.00 0.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT    VOLUME
EASTBOUND         0    0    0         0    0    0        0   0   0       0
SOUTHBOUND        0    0    0         0    0    0        0   0   0       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  LT-TH-RT  1800  2 0.900 1.000 1.000 1.000 1.000 0.900 0.981 1.000 2859
SB  LT        1800  1 0.900 1.000 1.000 1.000 1.000 0.900 1.000 0.950 1385
SB  TH        1800  1 0.967 1.000 1.000 1.000 1.000 0.900 1.000 1.000 1566
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CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v     s  v/s  g/C     c  v/c  CRITICAL
EB  LT-TH-RT 1516 2859 0.53 0.82 2338 0.65      *
SB  LT         66 1385 0.05 0.08  114 0.58
SB  TH         84 1566 0.05 0.08  129 0.65      *

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.58 TOTAL V/C= 0.65

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C      d1     c      d2   PF    Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.65 0.82  60.0   1.61 2338    0.45 0.85    1.76  A    4.4
SB  LT       0.58 0.08  60.0  20.16  114    5.07 1.00   25.23  D    1.0
SB  TH       0.65 0.08  60.0  20.29  129    7.29 0.85   23.44  C    1.3

DIR Delay LOS
EB   1.76  A
SB  24.23  C
INTERSECTION DELAY =  3.77 INTERSECTION LOS=A

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  15.6 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/HARRISON
NO BUILD CONDITIONS: PM PEAK HOUR
date:12-19-1988              time:13:02:34
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=i10nbpm    GEOMETRICS=kbint10p   SIGNAL=kbint10
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES        # OF LANES     LANE WIDTH      CROSS
DIR  LT   TH    RT     LT TH RT       LT    TH    RT     WALK
EB  352 1051   271      1  2  1      8.0   9.0   8.0     36
WB    0    0     0      0  0  0      0.0   0.0   0.0     34
NB    0    0     0      0  0  0      0.0   0.0   0.0     58
SB  194  193     0      1  1  0      9.0  11.0   0.0     29

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                 PEDESTRIANS         ARR
DIR GRADE %HV    Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%    Y      0     0  .910  100   Y     13.0     3
WB  0.0%  0.0%    N      0     0  .000  100   Y     13.0     0
NB  0.0%  0.0%    N      0     0  .000  100   Y     18.5     0
SB  0.0%  0.0%    N      0     0  .910  100   Y     18.5     3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN   Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *                          *           *  39.4    3    A
 2           *           *              *  *        14.6    3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR   LTV  THV   RTV    PHF   LTFR THFR RTFR
EB    352 1051   271  .910    387 1155  298
WB      0    0     0  .000      0    0    0
NB      0    0     0  .000      0    0    0
SB    194  193     0  .910    213  212    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N    LU     v  Plt  Prt
EB  LT          387 1 1.00   387 1.00 0.00
EB  TH         1155 2 1.05  1213 0.00 0.00
EB  RT          298 1 1.00   298 0.00 1.00
SB  LT          213 1 1.00   213 1.00 0.00
SB  TH          212 1 1.00   212 0.00 0.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                  OPPOSING APPROACH
BEING OPPOSED         VOLUMES       % OPPOSING LEFT TURN      # LANES      OPPOSING
                   LT    TH    RT        LT    TH    RT        LT  TH  RT      VOLUME
EASTBOUND           0     0     0         0     0     0         0   0   0           0
SOUTHBOUND          0     0     0         0     0     0         0   0   0           0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP   IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  LT          1800  1 0.867 1.000 1.000 1.000 1.000 0.900 1.000 0.950 1334
EB  TH          1800  2 0.900 1.000 1.000 1.000 1.000 0.900 1.000 1.000 2916
EB  RT          1800  1 0.867 1.000 1.000 1.000 1.000 0.900 0.802 1.000 1127
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SB  LT        1800  1 0.900 1.000 1.000 1.000 1.000 0.900 1.000 0.950 1385
SB  TH        1800  1 0.967 1.000 1.000 1.000 1.000 0.900 1.000 1.000 1566

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v     s  v/s  g/C    c  v/c  CRITICAL
EB  LT        387 1334 0.29 0.66  876 0.44
EB  TH       1213 2916 0.42 0.66 1915 0.63     *
EB  RT        298 1127 0.26 0.66  740 0.40
SB  LT        213 1385 0.15 0.24  337 0.63     *
SB  TH        212 1566 0.14 0.24  381 0.56

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.57 TOTAL V/C= 0.63

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1     c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT       0.44 0.66  60.0   3.78  876    0.24 1.00    4.02  A    2.2
EB  TH       0.63 0.66  60.0   4.60 1915    0.49 0.85    4.33  A    6.6
EB  RT       0.40 0.66  60.0   3.65  740    0.20 0.85    3.27  A    1.7
SB  LT       0.63 0.24  60.0  15.44  337    2.70 1.00   18.14  C    2.7
SB  TH       0.56 0.24  60.0  15.11  381    1.38 0.85   14.01  B    2.7

DIR Delay LOS
EB   4.10  A
SB  16.08  C
INTERSECTION DELAY =  6.29 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  15.0 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/HARRISON
NO BUILD CONDITIONS: SAT PEAK HOUR
date:12-20-1988             time:19:57:10
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I10NBSAT   GEOMETRICS=KBINT10A   SIGNAL=KBINT10
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES       # OF LANES     LANE WIDTH     CROSS
DIR  LT    TH    RT    LT TH RT      LT    TH    RT     WALK
EB  332   698   245     0  2  0      0.0   9.0   0.0     36
WB    0     0     0     0  0  0      0.0   0.0   0.0     34
NB    0     0     0     0  0  0      0.0   0.0   0.0     58
SB  165   115     0     1  1  0      9.0  11.0   0.0     29

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                PEDESTRIANS      ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   Y     0     0   .910  200   Y    13.0    3
WB  0.0%  0.0%   N     0     0   .000  200   Y    13.0    0
NB  0.0%  0.0%   N     0     0   .000  100   Y    18.5    0
SB  0.0%  0.0%   N     0     0   .910  100   Y    18.5    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *                          *           *  43.7   3    A
 2           *           *              *  *        10.3   3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR   LTV   THV   RTV    PHF   LTFR THFR RTFR
EB    332   698   245   .910    365  767  269
WB      0     0     0   .000      0    0    0
NB      0     0     0   .000      0    0    0
SB    165   115     0   .910    181  126    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N    LU     v   Plt  Prt
EB  LT-TH-RT   1401 2 1.05 1471 0.26 0.19
SB  LT          181 1 1.00  181 1.00 0.00
SB  TH          126 1 1.00  126 0.00 0.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                  OPPOSING APPROACH
BEING OPPOSED        VOLUMES       % OPPOSING LEFT TURN     # LANES      OPPOSING
                  LT    TH    RT        LT    TH    RT        LT  TH  RT     VOLUME
EASTBOUND          0     0     0         0     0     0         0   0   0        0
SOUTHBOUND         0     0     0         0     0     0         0   0   0        0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP   IDEAL N  Fwid   Fhv   Fgr  Fpark  Fbus  Farea   Frt   Flt    s
EB  LT-TH-RT   1800  2 0.900 0.990 1.000 1.000 1.000 0.900 0.962 0.949 2635
SB  LT         1800  1 0.900 1.000 1.000 1.000 1.000 0.900 1.000 0.950 1385
SB  TH         1800  1 0.967 1.000 1.000 1.000 1.000 0.900 1.000 1.000 1566

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH-RT 1471 2635 0.56 0.73 1921 0.77     *
SB  LT        181 1385 0.13 0.17  237 0.77     *
SB  TH        126 1566 0.08 0.17  268 0.47
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CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.69 TOTAL V/C= 0.77

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C      d1     c       d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.77 0.73  60.0    3.79 1921     1.34 0.85    4.36  A    6.3     6
SB  LT       0.77 0.17  60.0   18.03  237     9.37 1.00   27.40  D    2.6     5
SB  TH       0.47 0.17  60.0   17.05  268     1.01 0.85   15.35  C    1.7     2

DIR Delay LOS
EB   4.36  A
SB  22.45  C
INTERSECTION DELAY =  7.49 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  21.9 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/WASHINGTON
NO BUILD CONDITIONS (W/MITIGATION): PM PEAK HOUR
date:01-11-1989             time:07:59:50
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I11NBPM    GEOMETRICS=KBINT11M   SIGNAL=KBINT11
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB  124  949    0     0  3  0     0.0 11.0  0.0    28
WB    0    0    0     0  0  0     0.0  0.0  0.0    31
NB    0  231  724     0  2  1     0.0 11.0 11.0    36
SB    0    0    0     0  0  0     0.0  0.0  0.0    36

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0    0   .910  200   Y    11.8    3
WB  0.0%  0.0%         0    0   .000  200        11.8    0
NB  0.0%  2.0%   N     0    0   .910  590   Y    13.0    3
SB  0.0%  0.0%         0    0   .000  750   Y    13.0    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *                             *           *  28.5   3     A
 2           *           *     *  *                 65.5   3     A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB   124  949    0  .910   136 1043    0
WB     0    0    0  .000     0    0    0
NB     0  231  724  .910     0  254  796
SB     0    0    0  .000     0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
EB  LT-TH     1179 3 1.10 1297 0.12 0.00
NB  TH         254 2 1.05  267 0.00 0.00
NB  RT         796 1 1.00  796 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT.  TH   RT       LT  TH  RT    VOLUME
EASTBOUND         0    0    0         0    0    0        0   0   0       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt    Flt    s
EB  LT-TH     1800  3 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.941 4379
NB  TH        1800  2 0.967 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3101
NB  RT        1800  1 0.967 0.990 1.000 1.000 1.000 0.900 0.755 1.000 1170

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH    1297 4379 0.30 0.29 1249 1.04     *
NB  TH        267 3101 0.09 0.65 2030 0.13
NB  RT        796 1170 0.68 0.65  766 1.04     *

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.98 TOTAL V/C= 1.04
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LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH    1.04 0.29 100.0  27.58 1249   29.83 0.85   48.80  E  27.7   49
NB  TH       0.13 0.65 100.0   4.96 2030    0.00 0.85    4.21  A   2.4    2
NB  RT       1.04 0.65 100.0  14.15  766   35.54 0.85   42.23  E  13.1   29

DIR Delay LOS
EB  48.80  E
NB  32.69  D
INTERSECTION DELAY = 41.55 INTERSECTION LOS=E

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

THE V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS
THE EXISTING TIMING IS OPTIMAL
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LEVEL OF SERVICE CALCULATIONS:

400′ TOWER (1993) CONDITIONS

(AM, PM and SAT peak hours)

- Summer/High/South
- Summer/Lincoln/Bedford
- Summer/Otis/Kingston
- Bedford/Columbia
- Bedford/Kingston
- Bedford/Chauncy/LP Garage
- Surface Artery/Essex/Lincoln
- Essex/Kingston/Ave. DeLafayette
- Essex/Harrison/Chauncy
- Essex/Washington
- Harrison/Beach
- Chauncy/Ave. DeLafayette
  (AM and PM only)
- Kingston/KBE Garage
- Lincoln/KBE & 125 Summer Garage

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
SUMMER/HIGH/SOUTH STREETS
ALTERNATIVE 1 CONDITIONS: AM PEAK HOUR
date:12-16-1988             time:12:19:52
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I1ALT1AM   GEOMETRICS=KBINT1     SIGNAL=KBINT1
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB   82   46  102     0  2  0     0.0 10.0  0.0    10
WB    0  332  135     0  2  1     0.0 12.0 11.0    33
NB  163  567    0     1  1  0    10.0 11.0  0.0    27
SB   14   47  161     0  1  1     0.0 12.0 12.0    38

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   Y     0    0   .920  200   Y    11.3     3
WB  0.0%  2.0%   N     0   10   .920  400   Y    11.3     3
NB  0.0%  2.0%   N     0   30   .920  750   y    12.5     3
SB  0.0%  2.0%         0    0   .920 1100   y    12.5     3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *     *  *  *              *           *  21.8   4     A
 2           *           *  *  *  *     *  *  *     32.7   4     A

CYCLE=  62.5

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV    PHF  LTFR THFR RTFR
EB    82   46  102  .920    89   50  111
WB     0  332  135  .920     0  361  147
NB   163  567    0  .920   177  616    0
SB    14   47  161  .920    15   51  175

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU     v Plt  Prt
EB  LT-TH-RT   250 2 1.05  263 0.36 0.44
WB  TH         361 2 1.05  379 0.00 0.00
WB  RT         147 1 1.00  147 0.00 1.00
NB  LT         177 1 1.00  177 1.00 0.00
NB  TH         616 1 1.00  616 0.00 0.00
SB  LT-TH       66 1 1.00   66 0.23 0.00
SB  RT         175 1 1.00  175 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH    RT       LT  TH  RT     VOLUME
EASTBOUND         0  361  147       100  100    0        0   2   1     361
NORTHBOUND       15   51  175       100  100    0        0   1   1      51
SOUTHBOUND      177  616    0       100  100  100        1   1   0     616

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  LT-TH-RT  1800  2 0.933 0.990 1.000 1.000 1.000 0.900 0.775 0.837 1942
WB  TH        1800  2 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3208
WB  RT        1800  1 0.967 0.990 1.000 1.000 0.958 0.900 0.326 1.000  485
NB  LT        1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.846 1266
NB  TH        1800  1 0.967 0.990 1.000 1.000 0.875 0.900 1.000 1.000 1357
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SB  LT-TH      1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.658 1056
SB  RT         1800  1 1.000 0.990 1.000 1.000 1.000 0.900 0.755 1.000 1211

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
EB  63  22  2  250  250   89 0.36  2  361 0.00
NB  63  33  1  177  616  177 1.00  1   51 0.23
SB  63  33  1   66  226   15 0.23  1  616 0.00
CALCULATIONS
DIR Sop    Yo     Gu     Fs     Pl     Gq     Pt     Gf        El    Fm   Flt
EB 3600 0.100 17.261 0.649 0.851  4.535 0.149  0.345     1.732 0.674 0.837
NB 1387 0.037 31.565 0.843 1.000  1.139 0.000  0.000     1.334 0.846 0.846
SB 1800 0.342 17.191 0.490 0.230 15.514 0.770  5.826     2.297 0.658 0.658

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH-RT  263 1942 0.14 0.35  677 0.39
WB  TH        379 3208 0.12 0.35 1119 0.34
WB  RT        147  485 0.30 0.35  169 0.87      *
NB  LT        177 1266 0.14 0.52  662 0.27
NB  TH        616 1357 0.45 0.52  710 0.87      *
SB  LT-TH      66 1056 0.06 0.52  553 0.12
SB  RT        175 1211 0.14 0.52  633 0.28

CYCLE= 62.5  LOST= 8.0  SUM V/S CRIT= 0.76 TOTAL V/C= 0.87

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.39 0.35  62.5  11.65  677    0.19 0.85   10.07  B   2.8
WB  TH       0.34 0.35  62.5  11.42 1119    0.07 0.85    9.77  B   4.1
WB  RT       0.87 0.35  62.5  14.45  169   23.95 0.85   32.64  D   2.2
NB  LT       0.27 0.52  62.5   6.28  662    0.05 0.85    5.38  B   1.5
NB  TH       0.87 0.52  62.5   9.89  710    7.87 0.85   15.10  C   5.1
SB  LT-TH    0.12 0.52  62.5   5.76  553    0.00 0.85    4.90  A   0.5
SB  RT       0.28 0.52  62.5   6.31  633    0.06 0.85    5.42  B   1.4

DIR Delay LOS
EB  10.07  B
WB  16.15  C
NB  12.93  B
SB   5.28  B
INTERSECTION DELAY = 12.43 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  62.5 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  39.4 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
SUMMER/HIGH/SOUTH STREETS
ALTERNATIVE 1 CONDITIONS: PM PEAK HOUR
date:12-19-1988             time:14:13:44
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I1ALT1PM   GEOMETRICS=KBINT1      SIGNAL=KBINT1
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES        # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT     WALK
EB  181  127  146    0  2  0     0.0 10.0  0.0     10
WB    0  333   82    0  2  1     0.0 12.0 11.0     33
NB   97  227    0    1  1  0    10.0 11.0  0.0     27
SB   16   72  160    0  1  1     0.0 12.0 12.0     38

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                 PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   Y      2   30   .930  150   Y     11.3    3
WB  0.0%  2.0%   N      0   10   .930  100   Y     11.3    3
NB  0.0%  2.0%   N      0   30   .930 1000   y     12.5    3
SB  0.0%  2.0%          0    0   .930  850   y     12.5    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *     *  *  *              *           *  32.2   4    A
 2           *           *  *  *  *     *  *  *     19.8   4    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR   LTV  THV  RTV   PHF  LTFR THFR RTFR
EB    181  127  146  .930   195  137  157
WB      0  333   82  .930     0  358   88
NB     97  227    0  .930   104  244    0
SB     16   72  160  .930    17   77  172

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N   LU    v  Plt  Prt
EB  LT-TH-RT    488 2 1.05  513 0.40 0.32
WB  TH          358 2 1.05  376 0.00 0.00
WB  RT           88 1 1.00   88 0.00 1.00
NB  LT          104 1 1.00  104 1.00 0.00
NB  TH          244 1 1.00  244 0.00 0.00
SB  LT-TH        95 1 1.00   95 0.18 0.00
SB  RT          172 1 1.00  172 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                  OPPOSING APPROACH
BEING OPPOSED        VOLUMES        % OPPOSING LEFT TURN      # LANES      OPPOSING
                  LT   TH   RT          LT   TH    RT        LT  TH  RT     VOLUME
EASTBOUND          0  358   88         100  100     0         0   2   1       358
NORTHBOUND        17   77  172         100  100     0         0   1   1        77
SOUTHBOUND       104  244    0         100  100   100         1   1   0       244

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP   IDEAL N  Fwid   Fhv   Fgr  Fpark  Fbus Farea   Frt   Flt    s
EB  LT-TH-RT   1800  2 0.933 0.990 1.000 0.945 0.938 0.900 0.799 0.830 1758
WB  TH         1800  2 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3208
WB  RT         1800  1 0.967 0.990 1.000 1.000 0.958 0.900 0.445 1.000  662
NB  LT         1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.862 1291
NB  TH         1800  1 0.967 0.990 1.000 1.000 0.875 0.900 1.000 1.000 1357
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SB  LT-TH      1800   1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.951 1526
SB  RT         1800   1 1.000 0.990 1.000 1.000 1.000 0.900 0.779 1.000 1249

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm   Vlt  Plt No   Vo Plto
EB  60  32  2  488  488  195 0.40  2  358 0.00
NB  60  20  1  104  244  104 1.00  1   77 0.18
SB  60  20  1   95  249   17 0.18  1  244 0.00
CALCULATIONS
DIR Sop    Yo     Gu     Fs    Pl      Gq    Pt     Gf        El    Fm   Flt
EB 3600 0.099 29.079 0.651 0.946  3.075 0.054  0.114     1.728 0.660 0.830
NB 1634 0.047 17.849 0.827 1.000  1.997 0.000  0.000     1.361 0.862 0.862
SB 1800 0.136 13.546 0.722 0.182  6.299 0.818  4.216     1.557 0.951 0.951

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH-RT  513 1758 0.29 0.54  942 0.54     *
WB  TH        376 3208 0.12 0.54 1719 0.22
WB  RT         88  662 0.13 0.54  355 0.25
NB  LT        104 1291 0.08 0.33  427 0.24
NB  TH        244 1357 0.18 0.33  449 0.54     *
SB  LT-TH      95 1526 0.06 0.33  505 0.19
SB  RT        172 1249 0.14 0.33  413 0.42

CYCLE= 60.0  LOST= 8.0  SUM V/S CRIT= 0.47 TOTAL V/C= 0.54

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C      d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.54 0.54  60.0   6.93  942    0.51 0.85   6.33  B    3.8
WB  TH       0.22 0.54  60.0   5.56 1719    0.01 0.85   4.74  A    2.8
WB  RT       0.25 0.54  60.0   5.67  355    0.08 0.85   4.88  A    0.7
NB  LT       0.24 0.33  60.0  11.11  427    0.06 0.85   9.50  B    1.2
NB  TH       0.54 0.33  60.0  12.45  449    1.06 0.85  11.49  B    2.7
SB  LT-TH    0.19 0.33  60.0  10.89  505    0.02 0.85   9.27  B    1.1
SB  RT       0.42 0.33  60.0  11.84  413    0.41 0.85  10.42  B    1.9

DIR Delay LOS
EB   6.33  B
WB   4.77  A
NB  10.89  B
SB  10.01  B
INTERSECTION DELAY =  7.49 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  15.9 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
SUMMER/HIGH/SOUTH STREETS
ALTERNATIVE 1 CONDITIONS: SAT PEAK HOUR
date:12-20-1988             time:19:22:40
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I1ALT1S    GEOMETRICS=KBINT1      SIGNAL=KBINT1
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB   33   51   58     0  1  1      0.0 10.0 10.0   10
WB    0  279   56     0  2  1      0.0 12.0 11.0   33
NB   66   49    0     1  1  0     10.0 11.0  0.0   27
SB   10   40  201     0  1  1      0.0 12.0 12.0   38

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0    0   .910  200   Y    11.3    3
WB  0.0%  2.0%   N     0   10   .920  400   Y    11.3    3
NB  0.0%  2.0%   N     0   30   .920  750   y    12.5    3
SB  0.0%  2.0%         0    0   .920  500   y    12.5    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN   Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *     *  *  *              *           *  18.5    4    A
 2           *           *  *  *  *     *  *  *     33.5    4    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB    33   51   58  .910    36   56   64
WB     0  279   56  .920     0  303   61
NB    66   49    0  .920    72   53    0
SB    10   40  201  .920    11   43  218

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU     v Plt  Prt
EB  LT-TH         92 1 1.00    92 0.39 0.00
EB  RT            64 1 1.00    64 0.00 1.00
WB  TH           303 2 1.05   318 0.00 0.00
WB  RT            61 1 1.00    61 0.00 1.00
NB  LT            72 1 1.00    72 1.00 0.00
NB  TH            53 1 1.00    53 0.00 0.00
SB  LT-TH         54 1 1.00    54 0.20 0.00
SB  RT           218 1 1.00   218 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT  TH    RT       LT  TH  RT    VOLUME
EASTBOUND         0  303   61       100  100    0        0   2   1     303
NORTHBOUND       11   43  218       100  100    0        0   1   1      43
SOUTHBOUND       72   53    0       100  100  100        1   1   0      53

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  LT-TH     1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.887 1328
EB  RT        1800  1 0.933 0.990 1.000 1.000 1.000 0.900 0.493 1.000  738
WB  TH        1800  2 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3208
WB  RT        1800  1 0.967 0.990 1.000 1.000 0.958 0.900 0.612 1.000  909
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NB  LT        1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.857 1283
NB  TH        1800  1 0.967 0.990 1.000 1.000 0.875 0.900 1.000 1.000 1357
SB  LT-TH     1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604
SB  RT        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 0.755 1.000 1211

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N    Va   Vm  Vlt  Plt No    Vo Plto
EB  60  18  1    92  120   36 0.39  2   303 0.00
NB  60  34  1    72   53   72 1.00  1    43 0.20
SB  60  34  1    54  262   11 0.20  1    53 0.00
CALCULATIONS
DIR Sop    Yo      Gu     Fs    Pl      Gq    Pt     Gf        El    Fm   Flt
EB 3600 0.084 14.630 0.685 0.393  3.822 0.607  1.900     1.641 0.887 0.887
NB 1686 0.026 32.848 0.848 1.000  0.700 0.000  0.000     1.327 0.857 0.857
SB 1800 0.030 32.741 0.842 0.200  0.807 0.800  0.688     1.337 1.000 1.000

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH      92 1328 0.07 0.31  408 0.23
EB  RT         64  738 0.09 0.31  227 0.28
WB  TH        318 3208 0.10 0.31  987 0.32      *
WB  RT         61  909 0.07 0.31  280 0.22
NB  LT         72 1283 0.06 0.56  717 0.10
NB  TH         53 1357 0.04 0.56  759 0.07
SB  LT-TH      54 1604 0.03 0.56  897 0.06
SB  RT        218 1211 0.18 0.56  677 0.32      *

CYCLE= 60.0  LOST= 8.0  SUM V/S CRIT= 0.28 TOTAL V/C= 0.32

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1     c      d2   PF    Delay LOS Avg Q  95% Q
EB  LT-TH    0.23 0.31  60.0  11.75  408     0.05 0.85   10.03  B    1.1     1
EB  RT       0.28 0.31  60.0  11.97  227     0.19 0.85   10.33  B    0.7     1
WB  TH       0.32 0.31  60.0  12.14  987     0.07 0.85   10.38  B    3.5     3
WB  RT       0.22 0.31  60.0  11.72  280     0.06 0.85   10.01  B    0.7     1
NB  LT       0.10 0.56  60.0   4.69  717     0.00 0.85    3.99  A    0.5     1
NB  TH       0.07 0.56  60.0   4.61  759     0.00 0.85    3.92  A    0.4     1
SB  LT-TH    0.06 0.56  60.0   4.59  897     0.00 0.85    3.90  A    0.4     1
SB  RT       0.32 0.56  60.0   5.41  677     0.10 0.85    4.68  A    1.6     2

DIR Delay LOS
EB  10.15  B
WB  10.32  B
NB   3.96  A
SB   4.53  A
INTERSECTION DELAY =  7.75 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  11.3 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
SUMMER/LINCOLN/BEDFORD
ALTERNATIVE 1 CONDITIONS: AM PEAK HOUR
date:12-16-1988             time:12:23:09
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2ALT1AM   GEOMETRICS=KBINT2     SIGNAL=KBINT2
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB    0  105    3     0  1  1     0.0 10.0  9.0    36
WB  384  275    0     1  1  0    13.0 13.0  0.0    33
NB  268  353  120     1  1  1    10.0 10.0 10.0    27
SB    0    0    0     0  0  0     0.0  0.0  0.0     0

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0    0   .910  450   N    14.0    3
WB  0.0%  2.0%   N     0    0   .910 1000   N    14.0    3
NB  0.0%  2.0%   N     0    0   .910  850   N    11.8    3
SB  0.0%  0.0%         0    0   .000    0        11.8    0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1           *           *  *  *  *                 23.2   2    A
 2     *  *        *                 *           *   6.9   2    A
 3              *  *                             *  24.0   2    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0  105    3  .910      0  115    3
WB   384  275    0  .910    422  302    0
NB   268  353  120  .910    295  388  132
SB     0    0    0  .000      0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v Plt  Prt
EB  TH         115 1 1.00  115 0.00 0.00
EB  RT           3 1 1.00    3 0.00 1.00
WB  LT         422 1 1.00  422 1.00 0.00
WB  TH         302 1 1.00  302 0.00 0.00
NB  LT         295 1 1.00  295 1.00 0.00
NB  TH         388 1 1.00  388 0.00 0.00
NB  RT         132 1 1.00  132 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT     VOLUME
WESTBOUND         0  115    3         0    0    0        0   1   1        0
NORTHBOUND        0    0    0         0    0    0        0   0   0        0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  TH        1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
EB  RT        1800  1 0.900 0.990 1.000 1.000 1.000 0.900 0.445 1.000  643
WB  LT        1800  1 1.033 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1575
WB  TH        1800  1 1.033 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1657
NB  LT        1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1422
NB  TH         1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
NB  RT         1800  1 0.933 0.990 1.000 1.000 1.000 0.900 0.374 1.000  560

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP      v    s  v/s  g/C     c  v/c  CRITICAL
EB  TH          115 1497 0.08 0.11   172 0.67     *
EB  RT            3  643 0.01 0.11    74 0.04
WB  LT          422 1575 0.27 0.40   629 0.67     *
WB  TH          302 1657 0.18 0.55   907 0.33
NB  LT          295 1422 0.21 0.39   549 0.54
NB  TH          388 1497 0.26 0.39   578 0.67     *
NB  RT          132  560 0.24 0.39   216 0.61

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.60 TOTAL V/C= 0.67

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1     c      d2   PF    Delay LOS Avg Q  95% Q
EB  TH       0.67 0.11  60.0  19.36   172    6.57 0.85   22.04  C    1.7
EB  RT       0.04 0.11  60.0  17.96    74    0.00 0.85   15.27  C    0.0
WB  LT       0.67 0.40  60.0  11.24   629    1.95 1.00   13.20  B    4.2
WB  TH       0.33 0.55  60.0   5.71   907    0.08 0.85    4.93  A    2.3
NB  LT       0.54 0.39  60.0  10.84   549    0.83 1.00   11.67  B    3.0
NB  TH       0.67 0.39  60.0  11.60   578    2.12 0.85   11.66  B    4.0
NB  RT       0.61 0.39  60.0  11.25   216    3.50 0.85   12.53  B    1.3

DIR Delay LOS
EB  21.85  C
WB   9.75  B
NB  11.80  B
INTERSECTION DELAY = 11.62 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  16.5 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
SUMMER/LINCOLN/BEDFORD
ALTERNATIVE 1 CONDITIONS: PM PEAK HOUR
date:12-19-1988             time:14:09:33
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2ALT1PM   GEOMETRICS=KBINT2     SIGNAL=KBINT2
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB    0  200    5     0  1  1     0.0 10.0  9.0    36
WB  389  200    0     1  1  0    13.0 13.0  0.0    33
NB  158  250  256     1  1  1    10.0 10.0 10.0    27
SB    0    0    0     0  0  0     0.0  0.0  0.0     0

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0    0  .920  450   N    14.0     3
WB  0.0%  2.0%   N     0   21  .920 1000   N    14.0     3
NB  0.0%  2.0%   N     0    0  .920  850   N    11.8     3
SB  0.0%  0.0%         0    0  .000    0        11.8     0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1           *           *  *  *  *                 39.8   2    A
 2     *  *        *                 *           *  11.6   2    A
 3              *  *                             *  21.5   2    A

CYCLE=  79.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0  200    5  .920     0  217    5
WB   389  200    0  .920   423  217    0
NB   158  250  256  .920   172  272  278
SB     0    0    0  .000     0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
EB  TH          217 1 1.00  217 0.00 0.00
EB  RT            5 1 1.00    5 0.00 1.00
WB  LT          423 1 1.00  423 1.00 0.00
WB  TH          217 1 1.00  217 0.00 0.00
NB  LT          172 1 1.00  172 1.00 0.00
NB  TH          272 1 1.00  272 0.00 0.00
NB  RT          278 1 1.00  278 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT    VOLUME
WESTBOUND         0  217    5         0    0    0        0   1   1       0
NORTHBOUND        0    0    0         0    0    0        0   0   0       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  TH        1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
EB  RT        1800  1 0.900 0.990 1.000 1.000 1.000 0.900 0.445 1.000  643
WB  LT        1800  1 1.033 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1575
WB  TH        1800  1 1.033 0.990 1.000 1.000 0.913 0.900 1.000 1.000 1512
NB  LT        1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1422
NB  TH          1800   1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
NB  RT          1800   1 0.933 0.990 1.000 1.000 1.000 0.900 0.374 1.000  560

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s v/s  g/C     c v/c  CRITICAL
EB  TH          217 1497 0.15 0.15   221 0.99     *
EB  RT            5  643 0.01 0.15    95 0.06
WB  LT          423 1575 0.27 0.27   429 0.99     *
WB  TH          217 1512 0.14 0.44   673 0.32
NB  LT          172 1422 0.12 0.50   717 0.24
NB  TH          272 1497 0.18 0.50   755 0.36
NB  RT          278  560 0.50 0.50   282 0.99     *

CYCLE= 79.0  LOST= 6.0  SUM V/S CRIT= 0.91 TOTAL V/C= 0.99

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c g/C    C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH       0.99 0.15  79.0  25.54  221   42.66 0.85   57.97  E   5.5
EB  RT       0.06 0.15  79.0  22.01   95    0.00 0.85   18.71  C   0.1
WB  LT       0.99 0.27  79.0  21.73  429   29.96 1.00   51.69  E   9.4
WB  TH       0.32 0.44  79.0  10.80  673    0.10 0.85    9.27  B   2.6
NB  LT       0.24 0.50  79.0   8.39  717    0.03 1.00    8.42  B   1.9
NB  TH       0.36 0.50  79.0   9.01  755    0.13 0.85    7.77  B   3.0
NB  RT       0.99 0.50  79.0  14.67  282   37.45 0.85   44.30  E   4.9

DIR Delay LOS
EB  57.01  E
WB  37.28  D
NB  22.01  C
INTERSECTION DELAY = 33.10 INTERSECTION LOS=D

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  79.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 146.1 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
SUMMER/LINCOLN/BEDFORD
ALTERNATIVE 1 CONDITIONS: SAT PEAK HOUR
date:12-20-1988             time:19:28:59
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2ALT1S    GEOMETRICS=KBINT2     SIGNAL=KBINT2
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES     # OF LANES      LANE WIDTH     CROSS
DIR  LT  TH    RT    LT TH RT      LT   TH   RT    WALK
EB    0  105    5     0  1  1     0.0 10.0  9.0    36
WB  265  282    0     1  1  0    13.0 13.0  0.0    33
NB   26  176  166     1  1  1    10.0 10.0 10.0    27
SB    0    0    0     0  0  0     0.0  0.0  0.0     0

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0    0   .910  450   N    14.0    3
WB  0.0%  2.0%   N     0   21   .910  500   N    14.0    3
NB  0.0%  2.0%   N     0    0   .910  500   N    11.8    3
SB  0.0%  0.0%         0    0   .000    0         11.8    0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1           *           *  *  *  *                 23.3   2    A
 2     *  *        *                 *           *   9.0   2    A
 3              *  *                             *  21.7   2    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0  105    5  .910     0  115    5
WB   265  282    0  .910   291  310    0
NB    26  176  166  .910    29  193  182
SB     0    0    0  .000     0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt Prt
EB  TH         115 1 1.00  115 0.00 0.00
EB  RT           5 1 1.00    5 0.00 1.00
WB  LT         291 1 1.00  291 1.00 0.00
WB  TH         310 1 1.00  310 0.00 0.00
NB  LT          29 1 1.00   29 1.00 0.00
NB  TH         193 1 1.00  193 0.00 0.00
NB  RT         182 1 1.00  182 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT    VOLUME
WESTBOUND         0  115    5         0    0    0        0   1   1       0
NORTHBOUND        0    0    0         0    0    0        0   0   0       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  TH         1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
EB  RT         1800  1 0.900 0.990 1.000 1.000 1.000 0.900 0.612 1.000  883
WB  LT         1800  1 1.033 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1575
WB  TH         1800  1 1.033 0.990 1.000 1.000 0.913 0.900 1.000 1.000 1512
NB  LT         1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1422
NB  TH        1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
NB  RT        1800  1 0.933 0.990 1.000 1.000 1.000 0.900 0.612 1.000  916

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  TH        115 1497 0.08 0.15  225 0.51     *
EB  RT          5  883 0.01 0.15  133 0.04
WB  LT        291 1575 0.18 0.36  568 0.51     *
WB  TH        310 1512 0.20 0.54  824 0.38
NB  LT         29 1422 0.02 0.39  553 0.05
NB  TH        193 1497 0.13 0.39  582 0.33
NB  RT        182  916 0.20 0.39  356 0.51     *

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.46 TOTAL V/C= 0.51

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH       0.51 0.15  60.0  17.83  225    1.64 0.85   16.55  C   1.6     2
EB  RT       0.04 0.15  60.0  16.56  133    0.00 0.85   14.08  B   0.1     1
WB  LT       0.51 0.36  60.0  11.42  568    0.66 1.00   12.09  B   3.1     4
WB  TH       0.38 0.54  60.0   5.94  824    0.14 0.85    5.17  B   2.4     2
NB  LT       0.05 0.39  60.0   8.70  553    0.00 1.00    8.70  B   0.3     1
NB  TH       0.33 0.39  60.0   9.79  582    0.13 0.85    8.43  B   2.0     2
NB  RT       0.51 0.39  60.0  10.64  356    1.05 0.85    9.94  B   1.9     2

DIR Delay LOS
EB  16.43  C
WB   8.52  B
NB   9.13  B
INTERSECTION DELAY =  9.59 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  11.7 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
OTIS/KINGSTON/SUMMER STREETS
ALTERNATIVE 1 CONDITIONS: AM PEAK HOUR
date:12-16-1988             time:12:26:59
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I3ALT1AM   GEOMETRICS=KBINT3     SIGNAL=KBINT3
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES       # OF LANES     LANE WIDTH     CROSS
DIR  LT    TH    RT    LT TH RT      LT    TH    RT     WALK
EB    0    50    52     0  1  1     0.0  12.0  12.0     25
WB   86     0     0     1  0  0    12.0   0.0   0.0     32
NB    0     0     0     0  0  0     0.0   0.0   0.0      0
SB   56   185     0     1  1  0    12.0  12.0   0.0     25

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK               PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   Y    10    0   .880  400   N    11.0    3
WB  0.0%  2.0%   N     0    0   .880  400   N    11.0    3
NB  0.0%  0.0%         0    0   .880    0         9.3    3
SB  0.0%  2.0%   N     0    0   .880  400   N     9.3    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1     *  *     *                    *           *  17.8   4     A
 2           *           *              *  *        34.2   4     A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR   LTV   THV   RTV    PHF   LTFR THFR RTFR
EB      0    50    52  .880     0   57   59
WB     86     0     0  .880    98    0    0
NB      0     0     0  .880     0    0    0
SB     56   185     0  .880    64  210    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N    LU     v   Plt  Prt
EB  TH           57 1 1.00    57 0.00 0.00
EB  RT           59 1 1.00    59 0.00 1.00
WB  LT           98 1 1.00    98 1.00 0.00
SB  LT           64 1 1.00    64 1.00 0.00
SB  TH          210 1 1.00   210 0.00 0.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                 OPPOSING APPROACH
BEING OPPOSED       VOLUMES       % OPPOSING LEFT TURN      # LANES      OPPOSING
                  LT    TH    RT        LT    TH    RT        LT  TH  RT      VOLUME
WESTBOUND          0    57    59       100   100     0         0   1   1        57
SOUTHBOUND         0     0     0         0     0     0         0   0   0         0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP   IDEAL N  Fwid   Fhv   Fgr  Fpark  Fbus  Farea   Frt   Flt    s
EB  TH          1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604
EB  RT          1800  1 1.000 0.990 1.000 0.849 1.000 0.900 0.850 1.000 1157
WB  LT          1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.913 1465
SB  LT          1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
SB  TH          1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
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DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
WB  60  18  1   98    0   98 1.00  1   57 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
WB 1800 0.032 16.414 0.839 1.000  1.376 0.000  0.000    1.340 0.913 0.913

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  TH         57 1604 0.04 0.30  476 0.12
EB  RT         59 1157 0.05 0.30  343 0.17
WB  LT         98 1465 0.07 0.30  434 0.22      *
SB  LT         64 1524 0.04 0.57  869 0.07
SB  TH        210 1604 0.13 0.57  915 0.23      *

CYCLE= 60.0  LOST= 8.0  SUM V/S CRIT= 0.20 TOTAL V/C= 0.23

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1     c      d2   PF   Delay LOS Avg Q   95% Q
EB  TH       0.12 0.30  60.0  11.70  476    0.01 0.85    9.95  B   0.7
EB  RT       0.17 0.30  60.0  11.89  343    0.02 0.85   10.13  B   0.7
WB  LT       0.22 0.30  60.0  12.09  434    0.05 0.85   10.32  B   1.1
SB  LT       0.07 0.57  60.0   4.40  869    0.00 1.00    4.40  A   0.5
SB  TH       0.23 0.57  60.0   4.85  915    0.02 0.85    4.14  A   1.5

DIR Delay LOS
EB  10.04  B
WB  10.32  B
SB   4.20  A
INTERSECTION DELAY =  6.81 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  10.1 SECONDS
for chosen cycle length  60.0
suggested timing phase 1 is  17.5 secs green,   4.0 secs yellow + red clear
suggested timing phase 2 is  34.5 secs green,   4.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
OTIS/KINGSTON/SUMMER STREETS
ALTERNATIVE 1 CONDITIONS: PM PEAK HOUR
date:12-19-1988             time:14:06:42
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I3ALT1PM   GEOMETRICS=KBINT3     SIGNAL=KBINT3
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB    0  115   84     0  1  1     0.0 12.0 12.0    25
WB   92    0    0     1  0  0    12.0  0.0  0.0    32
NB    0    0    0     0  0  0     0.0  0.0  0.0     0
SB   89  326    0     1  1  0    12.0 12.0  0.0    25

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   Y     10   0   .980  400   N    11.0    3
WB  0.0%  2.0%   N      0   0   .980  400   N    11.0    3
NB  0.0%  0.0%          0   0   .980    0          9.3    3
SB  0.0%  2.0%   N      0   0   .980  400   N     9.3    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1     *  *     *                    *           *  13.7   4    A
 2           *           *              *  *        38.3   4    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB      0  115   84  .980     0  117   86
WB     92    0    0  .980    94    0    0
NB      0    0    0  .980     0    0    0
SB     89  326    0  .980    91  333    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt Prt
EB  TH         117 1 1.00  117 0.00 0.00
EB  RT          86 1 1.00   86 0.00 1.00
WB  LT          94 1 1.00   94 1.00 0.00
SB  LT          91 1 1.00   91 1.00 0.00
SB  TH         333 1 1.00  333 0.00 0.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT    VOLUME
WESTBOUND         0  117   86        100 100    0        0   1   1     117
SOUTHBOUND        0    0    0          0   0    0        0   0   0       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  TH        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604
EB  RT        1800  1 1.000 0.990 1.000 0.849 1.000 0.900 0.850 1.000 1157
WB  LT        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.837 1342
SB  LT        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
SB  TH        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
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```
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
WB  60  14  1   94    0   94 1.00  1  117 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
WB 1800 0.065 10.452 0.802 1.000  3.230 0.000  0.000    1.403 0.837 0.837

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  TH        117 1604 0.07 0.23  366 0.32
EB  RT         86 1157 0.07 0.23  264 0.32     *
WB  LT         94 1342 0.07 0.23  306 0.31
SB  LT         91 1524 0.06 0.64  973 0.09
SB  TH        333 1604 0.21 0.64 1024 0.32     *

CYCLE= 60.0  LOST= 8.0  SUM V/S CRIT= 0.28 TOTAL V/C= 0.32

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH       0.32 0.23  60.0  14.66  366    0.18 0.85   12.62  B   1.5
EB  RT       0.32 0.23  60.0  14.67  264    0.26 0.85   12.70  B   1.1
WB  LT       0.31 0.23  60.0  14.61  306    0.19 0.85   12.58  B   1.2
SB  LT       0.09 0.64  60.0   3.17  973    0.00 1.00    3.17  A   0.5
SB  TH       0.32 0.64  60.0   3.76 1024    0.07 0.85    3.25  A   2.0

DIR Delay LOS
EB  12.65  B
WB  12.58  B
SB   3.23  A
INTERSECTION DELAY =  7.11 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  11.4 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
OTIS/KINGSTON/SUMMER STREETS
ALTERNATIVE 1 CONDITIONS: SAT PEAK HOUR
date:12-20-1988             time:19:36:14
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I3ALT1S    GEOMETRICS=KBINT3     SIGNAL=KBINT3
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES        # OF LANES      LANE WIDTH     CROSS
DIR  LT    TH    RT     LT TH RT       LT    TH    RT     WALK
EB    0    73    86      0  1  1      0.0 12.0 12.0     25
WB  151     0     0      1  0  0     12.0  0.0  0.0     32
NB    0     0     0      0  0  0      0.0  0.0  0.0     26
SB   38   190     0      1  1  0     12.0 12.0  0.0     25

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK               PEDESTRIANS       ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     10     0   .880  400   N     11.0    3
WB  0.0%  2.0%   N      0     0   .880  400   N     11.0    3
NB  0.0%  0.0%          0     0   .000  500          9.5    3
SB  0.0%  2.0%   N      0     0   .880  400   N      9.5    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1     *  *     *                    *           *  25.0   4    A
 2           *           *              *  *        27.0   4    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0   73   86  .880     0   83   98
WB   151    0    0  .880   172    0    0
NB     0    0    0  .000     0    0    0
SB    38  190    0  .880    43  216    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP    FLOW N    LU     v  Plt  Prt
EB  TH            83 1 1.00    83 0.00 0.00
EB  RT            98 1 1.00    98 0.00 1.00
WB  LT           172 1 1.00   172 1.00 0.00
SB  LT            43 1 1.00    43 1.00 0.00
SB  TH           216 1 1.00   216 0.00 0.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED        VOLUMES       % OPPOSING LEFT TURN      # LANES      OPPOSING
                  LT    TH    RT        LT    TH    RT        LT  TH  RT      VOLUME
WESTBOUND          0    83    98       100   100     0         0   1   1        83
SOUTHBOUND         0     0     0         0     0     0         0   0   0         0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP    IDEAL N   Fwid    Fhv    Fgr  Fpark   Fbus  Farea    Frt    Flt     s
EB  TH          1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604
EB  RT          1800  1 1.000 0.990 1.000 1.000 1.000 0.900 0.612 1.000  981
WB  LT          1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.842 1351
SB  LT          1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
SB  TH          1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
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DIR  C   G  N   Va    Vm  Vlt  Plt No   Vo Plto
WB  60  25  1  172     0  172 1.00  1   83 0.00
CALCULATIONS
DIR Sop    Yo      Gu     Fs     Pl      Gq     Pt      Gf        El     Fm    Flt
WB 1800 0.046 23.351 0.823 1.000  1.689 0.000  0.000    1.367 0.842 0.842

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP      v     s  v/s  g/C     c  v/c  CRITICAL
EB  TH           83 1604 0.05 0.42   669 0.12
EB  RT           98  981 0.10 0.42   410 0.24
WB  LT          172 1351 0.13 0.42   564 0.30      *
SB  LT           43 1524 0.03 0.45   685 0.06
SB  TH          216 1604 0.13 0.45   721 0.30      *

CYCLE= 60.0  LOST= 8.0  SUM V/S CRIT= 0.26 TOTAL V/C= 0.30

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C      d1    c       d2   PF   Delay LOS Avg Q  95% Q
EB  TH       0.12 0.42  60.0   8.16  669     0.00 0.85    6.94  B    0.8     1
EB  RT       0.24 0.42  60.0   8.60  410     0.06 0.85    7.36  B    0.9     1
WB  LT       0.30 0.42  60.0   8.87  564     0.10 0.85    7.62  B    1.7     2
SB  LT       0.06 0.45  60.0   7.12  685     0.00 1.00    7.12  B    0.4     1
SB  TH       0.30 0.45  60.0   7.99  721     0.07 0.85    6.85  B    2.0     2

DIR Delay LOS
EB   7.17  B
WB   7.62  B
SB   6.90  B
INTERSECTION DELAY =  7.18 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  11.0 SECONDS
for chosen cycle length  60.0
suggested timing phase 1 is  25.2 secs green,   4.0 secs yellow + red clear
suggested timing phase 2 is  26.8 secs green,   4.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 1 of 2)
DATE:12-16-1988             TIME:12:35:09
BEDFORD/COLUMBIA ALTERNATIVE 1 CONDITIONS: AM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=I4ALT1AM   GEOMETRICS=KBINT4
KEY: A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: N

MINOR STREET LANES
APPROACH: C: COLUMBIA NB
SHARED LEFT AND RIGHT TURN LANE: YES
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO


SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: BEDFORD EB  B: BEDFORD WB  C: COLUMBIA NB
LEFTS             0.00           0.00           0.00
THRUS             0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00


APPROACH        A: BEDFORD EB  B: BEDFORD WB  C: COLUMBIA NB
                 LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0    0    1    0  656    0    1    0    0
PHF               0.77           0.77           0.77
ADJ VOLUME        0    0    1    0  852    0    1    0    0
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR       0              0              1    0    0

STEP 1 RIGHT TURNS FROM     C:COLUMBIA NB
CONFLICTING FLOWS                        1
CRITICAL GAPS                          5.0
CAPACITY                              1199
ACTUAL CAPACITY                       1199


STEP 2 LEFT TURNS FROM     B:BEDFORD WB
CONFLICTING FLOWS                        1
CRITICAL GAPS                          4.5
CAPACITY                              1308
CAPACITY USED                            0%
IMPEDANCE FACTOR                      1.00
ACTUAL CAPACITY                       1308
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1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 2 of 2)
DATE:12-16-1988            TIME:12:35:09
BEDFORD/COLUMBIA ALTERNATIVE 1 CONDITIONS: AM PEAK HOUR


STEP 3 LEFT TURNS FROM     C:COLUMBIA NB
CONFLICTING FLOWS                      853
CRITICAL GAPS                          6.0
CAPACITY                               339
ACTUAL CAPACITY                        339

                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT               DEMAND    CAPACITY   RESERVE   LOS  AVG DEL(SEC) AVG QUEU


ALL MOVES FROM C:          1        339       337      B     10.67         0.00
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 1 of 2)
DATE:12-19-1988             TIME:14:03:24
BEDFORD/COLUMBIA ALTERNATIVE 1 CONDITIONS: PM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=I4ALT1PM   GEOMETRICS=KBINT4
KEY: A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: N

MINOR STREET LANES
APPROACH: C: COLUMBIA NB
SHARED LEFT AND RIGHT TURN LANE: YES
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO


SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: BEDFORD EB  B: BEDFORD WB  C: COLUMBIA NB
LEFTS             0.00           0.00           0.00
THRUS             0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00


APPROACH        A: BEDFORD EB  B: BEDFORD WB  C: COLUMBIA NB
                 LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0    0    1    1  553    0   18    0    0
PHF               0.94           0.94           0.94
ADJ VOLUME        0    0    1    1  588    0   19    0    0
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR       0              1             21    0    0

STEP 1 RIGHT TURNS FROM     C:COLUMBIA NB
CONFLICTING FLOWS                        1
CRITICAL GAPS                          5.0
CAPACITY                              1199
ACTUAL CAPACITY                       1199

STEP 2 LEFT TURNS FROM     B:BEDFORD WB
CONFLICTING FLOWS                        1
CRITICAL GAPS                          4.5
CAPACITY                              1308
CAPACITY USED                            0%
IMPEDANCE FACTOR                      1.00
ACTUAL CAPACITY                       1308
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1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 2 of 2)
DATE:12-19-1988              TIME:14:03:24
BEDFORD/COLUMBIA ALTERNATIVE 1 CONDITIONS: PM PEAK HOUR


STEP 3 LEFT TURNS FROM      C:COLUMBIA NB
CONFLICTING FLOWS                     590
CRITICAL GAPS                         6.0
CAPACITY                              488
ACTUAL CAPACITY                       488


                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT               DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUEU

LT FROM B:                1        1308      1307     A       2.76            0.00

ALL MOVES FROM C:        21         488       467     A       7.71            0.05
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 1 of 2)
DATE:12-20-1988             TIME:20:35:30
BEDFORD/COLUMBIA ALTERNATIVE 1 CONDITIONS: SAT PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=I4ALT1S    GEOMETRICS=KBINT4
KEY: A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: N

MINOR STREET LANES
APPROACH: C: COLUMBIA NB
SHARED LEFT AND RIGHT TURN LANE: YES
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO


SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: BEDFORD EB  B: BEDFORD WB  C: COLUMBIA NB
LEFTS             0.00           0.00           0.00
THRUS             0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00


APPROACH        A: BEDFORD EB  B: BEDFORD WB  C: COLUMBIA NB
                 LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0    0    1    0  435    0   19    0    0
PHF               0.77           0.77           0.77
ADJ VOLUME        0    0    1    0  565    0   25    0    0
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR       0              0             27    0    0

STEP 1 RIGHT TURNS FROM     C:COLUMBIA NB
CONFLICTING FLOWS                        1
CRITICAL GAPS                          5.0
CAPACITY                              1199
ACTUAL CAPACITY                       1199

STEP 2 LEFT TURNS FROM     B:BEDFORD WB
CONFLICTING FLOWS                        1
CRITICAL GAPS                          4.5
CAPACITY                              1308
CAPACITY USED                            0%
IMPEDANCE FACTOR                      1.00
ACTUAL CAPACITY                       1308
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1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 2 of 2)
DATE:12-20-1988             TIME:20:35:30
BEDFORD/COLUMBIA ALTERNATIVE 1 CONDITIONS: SAT PEAK HOUR


STEP 3 LEFT TURNS FROM     C:COLUMBIA NB
CONFLICTING FLOWS                      566
CRITICAL GAPS                          6.0
CAPACITY                               504
ACTUAL CAPACITY                        504


                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT               DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUEU


ALL MOVES FROM C:         27        504       477     A      7.54          0.06
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
KINGSTON/BEDFORD
ALTERNATIVE 1 CONDITIONS: AM PEAK HOUR
date:12-16-1988             time:12:41:31
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I5ALT1AM   GEOMETRICS=KBINT5     SIGNAL=KBINT5
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB    0    0  175     0  0  1     0.0  0.0 12.0    40
WB  133  513    0     1  1  0    12.0 12.0  0.0    40
NB    0    0    0     0  0  0     0.0  0.0  0.0     0
SB    0  182  102     0  1  0     0.0 12.0  0.0    25

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%   Y     0    0  .880  100   Y    14.0    3
WB  0.0%  2.0%   Y     0    0  .880  550   Y    14.0    3
NB  0.0%  0.0%         0    0  .000    0        10.3    0
SB  0.0%  2.0%   Y     0    0  .880  550   Y    10.3    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1        *     *  *                             *  32.5   3    A
 2           *           *                 *  *     21.5   3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0    0  175  .880     0    0  199
WB   133  513    0  .880   151  583    0
NB     0    0    0  .000     0    0    0
SB     0  182  102  .880     0  207  116

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N    LU    v  Plt Prt
EB  RT          199 1 1.00  199 0.00 1.00
WB  LT          151 1 1.00  151 1.00 0.00
WB  TH          583 1 1.00  583 0.00 0.00
SB  TH-RT       323 1 1.00  323 0.00 0.36

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT    VOLUME
WESTBOUND         0    0  199      100    0    0         0   0   1       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  RT        1800  1 1.000 1.000 1.000 1.000 1.000 0.900 0.850 1.000 1377
WB  LT        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
WB  TH        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604
SB  TH-RT     1800  1 1.000 0.990 1.000 1.000 1.000 0.900 0.834 1.000 1338

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  RT        199 1377 0.14 0.54  745 0.27
WB  LT        151 1524 0.10 0.54  824 0.18
WB  TH        583 1604 0.36 0.54  868 0.67     *
```

```
SB  TH-RT     323 1338 0.24 0.36  480 0.67     *

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.60 TOTAL V/C= 0.67

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C      d1     c       d2    PF   Delay LOS Avg Q  95% Q
EB  RT       0.27 0.54  60.0   5.61  745    0.05 0.85    4.81  A   1.5
WB  LT       0.18 0.54  60.0   5.33  824    0.01 1.00    5.34  B   1.2
WB  TH       0.67 0.54  60.0   7.54  868    1.43 0.85    7.63  B   4.5
SB  TH-RT    0.67 0.36  60.0  12.35  480    2.54 0.85   12.65  B   3.4

DIR Delay LOS
EB   4.81  A
WB   7.16  B
SB  12.65  B
INTERSECTION DELAY =  8.20 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  16.5 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
KINGSTON/ESSEX/AVE DE LAFAYETTE
NO BUILD CONDITIONS - 2-WAY ESSEX: AM PEAK HOUR
date:01-06-1989             time:09:30:00
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I9NBEA     GEOMETRICS=I9ALT1E    SIGNAL=I9ALT1E
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH    RT    LT  TH  RT      LT   TH    RT    WALK
EB     0  705    44     0  2  1      0.0 11.0 10.0     35
WB     0  682     0     0  2  0      0.0 11.0  0.0     35
NB     0    0     0     0  0  0      0.0  0.0  0.0     33
SB  233   98    20     1  1  1     12.0 12.0 10.0     35

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES   PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%   N      0     0   .940  100    Y     12.8     3
WB  0.0%  2.0%   N      0     0   .940  100    Y     12.8     3
NB  0.0%  0.0%   N      0     0   .000  100    Y     12.8     0
SB  0.0%  2.0%   N      0     0   .940  100    Y     12.8     3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN   Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1     *  *        *                 *           *  32.8    3    A
 2           *           *              *  *  *     21.2    3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV    PHF  LTFR THFR RTFR
EB      0  705   44  .940     0  750   47
WB      0  682    0  .940     0  726    0
NB      0    0    0  .000     0    0    0
SB    233   98   20  .940   248  104   21

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU     v  Plt  Prt
EB  TH           750 2 1.05  787 0.00 0.00
EB  RT            47 1 1.00   47 0.00 1.00
WB  TH           726 2 1.05  762 0.00 0.00
SB  LT           248 1 1.00  248 1.00 0.00
SB  TH           104 1 1.00  104 0.00 0.00
SB  RT            21 1 1.00   21 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT        LT  TH  RT    VOLUME
SOUTHBOUND        0    0    0         0    0    0        0   0   0       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  TH         1800  2 0.967 1.000 1.000 1.000 1.000 0.900 1.000 1.000 3132
EB  RT         1800  1 0.933 1.000 1.000 1.000 1.000 0.900 0.802 1.000 1213
WB  TH         1800  2 0.967 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3101
SB  LT         1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
SB  TH         1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604
SB  RT         1800  1 0.933 0.990 1.000 1.000 1.000 0.900 0.802 1.000 1201

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
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EB  TH           787 3132 0.25 0.55 1712 0.46      *
EB  RT            47 1213 0.04 0.55  663 0.07
WB  TH           762 3101 0.25 0.55 1695 0.45
SB  LT           248 1524 0.16 0.35  539 0.46      *
SB  TH           104 1604 0.06 0.35  567 0.18
SB  RT            21 1201 0.02 0.35  425 0.05

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.41 TOTAL V/C= 0.46

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH       0.46 0.55  60.0   6.27 1712   0.15 0.85   5.45  B   5.7     6
EB  RT       0.07 0.55  60.0   4.88  663   0.00 0.85   4.15  A   0.4     1
WB  TH       0.45 0.55  60.0   6.22 1695   0.13 0.85   5.40  B   5.5     5
SB  LT       0.46 0.35  60.0  11.38  539   0.46 1.00  11.84  B   2.7     3
SB  TH       0.18 0.35  60.0  10.19  567   0.02 0.85   8.68  B   1.1     1
SB  RT       0.05 0.35  60.0   9.70  425   0.00 0.85   8.25  B   0.2     1

DIR Delay LOS
EB   5.38  B
WB   5.40  B
SB  10.75  B
INTERSECTION DELAY =  6.40 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  10.6 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
KINGSTON/BEDFORD
ALTERNATIVE 1 CONDITIONS: PM PEAK HOUR
date:12-19-1988              time:13:59:09
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I5ALT1P    GEOMETRICS=KBINT5     SIGNAL=KBINT5
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES       # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT     LT TH RT      LT    TH    RT     WALK
EB    0    0  365      0  0  1     0.0   0.0  12.0     40
WB  213  358    0      1  1  0    12.0  12.0   0.0     40
NB    0    0    0      0  0  0     0.0   0.0   0.0      0
SB    0  380  170      0  1  0     0.0  12.0   0.0     25

TRAFFIC & ROADWAY CONDITIONS
                   ADJ PARK                PEDESTRIANS       ARR
DIR GRADE %HV    Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%    Y     0     0   .940  100   Y     14.0    3
WB  0.0%  2.0%    Y     0     0   .940  550   Y     14.0    3
NB  0.0%  0.0%          0     0   .000    0         10.3    0
SB  0.0%  2.0%    Y     0     0   .940  550   Y     10.3    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN   Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1        *     *  *                             *  21.3    3    A
 2           *           *                 *  *     32.7    3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR   LTV   THV   RTV    PHF   LTFR THFR RTFR
EB      0     0   365   .940      0    0  388
WB    213   358     0   .940    227  381    0
NB      0     0     0   .000      0    0    0
SB      0   380   170   .940      0  404  181

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP    FLOW N    LU      v  Plt  Prt
EB  RT           388 1 1.00    388 0.00 1.00
WB  LT           227 1 1.00    227 1.00 0.00
WB  TH           381 1 1.00    381 0.00 0.00
SB  TH-RT        585 1 1.00    585 0.00 0.31

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES        % OPPOSING LEFT TURN     # LANES      OPPOSING
                  LT    TH    RT        LT    TH    RT       LT  TH  RT      VOLUME
WESTBOUND          0     0   388       100     0     0        0   0   1           0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP    IDEAL N   Fwid    Fhv    Fgr  Fpark  Fbus  Farea    Frt    Flt     s
EB  RT           1800  1 1.000 1.000 1.000 1.000 1.000 0.900 0.850 1.000 1377
WB  LT           1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
WB  TH           1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604
SB  TH-RT        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 0.844 1.000 1353

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP       v     s  v/s  g/C     c  v/c  CRITICAL
EB  RT           388  1377 0.28 0.36   489 0.79      *
WB  LT           227  1524 0.15 0.36   541 0.42
WB  TH           381  1604 0.24 0.36   570 0.67
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SB  TH-RT     585 1353 0.43 0.54  737 0.79     *

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.71 TOTAL V/C= 0.79

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  RT       0.79 0.36 60.0  13.20 489    6.05 0.85   16.36  C   4.2
WB  LT       0.42 0.36 60.0  11.13 541    0.32 1.00   11.45  B   2.4
WB  TH       0.67 0.36 60.0  12.43 570    2.10 0.85   12.35  B   4.1
SB  TH-RT    0.79 0.54 60.0   8.33 737    4.17 0.85   10.62  B   4.4

DIR Delay LOS
EB  16.36  C
WB  12.02  B
SB  10.62  B
INTERSECTION DELAY = 12.57 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  24.2 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
KINGSTON/BEDFORD
ALTERNATIVE 1 CONDITIONS: SAT PEAK HOUR
date:12-20-1988                time:20:31:21
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I5ALT1S    GEOMETRICS=KBINT5      SIGNAL=KBINT5
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES        # OF LANES      LANE WIDTH      CROSS
DIR  LT    TH    RT    LT TH RT      LT    TH    RT    WALK
EB    0     0   225     0  0  1     0.0   0.0  12.0    40
WB  115   337     0     1  1  0    12.0  12.0   0.0    40
NB    0     0     0     0  0  0     0.0   0.0   0.0     0
SB    0   233   195     0  1  0     0.0  12.0   0.0    25

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%   Y     0     0   .880  100   Y    14.0    3
WB  0.0%  2.0%   Y     0     0   .880  200   Y    14.0    3
NB  0.0%  0.0%         0     0   .000    0        10.3    0
SB  0.0%  2.0%   Y     0     0   .880  200   Y    10.3    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1        *     *  *                             *  21.1   3     A
 2           *           *                 *  *     32.9   3     A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF   LTFR THFR RTFR
EB     0    0  225  .880     0    0  256
WB   115  337    0  .880   131  383    0
NB     0    0    0  .000     0    0    0
SB     0  233  195  .880     0  265  222

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N   LU    v  Plt  Prt
EB  RT          256 1 1.00  256 0.00 1.00
WB  LT          131 1 1.00  131 1.00 0.00
WB  TH          383 1 1.00  383 0.00 0.00
SB  TH-RT       486 1 1.00  486 0.00 0.46

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED         VOLUMES       % OPPOSING LEFT TURN      # LANES      OPPOSING
                  LT   TH   RT          LT   TH   RT         LT  TH  RT     VOLUME
WESTBOUND          0    0  256         100    0    0          0   0   1          0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP   IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  RT          1800  1 1.000 1.000 1.000 1.000 1.000 0.900 0.850 1.000 1377
WB  LT          1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
WB  TH          1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604
SB  TH-RT       1800  1 1.000 0.990 1.000 1.000 1.000 0.900 0.817 1.000 1310

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v    s  v/s  g/C    c  v/c  CRITICAL
EB  RT          256 1377 0.19 0.35  485 0.53
WB  LT          131 1524 0.09 0.35  537 0.24
WB  TH          383 1604 0.24 0.35  565 0.68    *
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SB  TH-RT     486 1310 0.37 0.55  718 0.68      *

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.61 TOTAL V/C= 0.68

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C      d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  RT       0.53 0.35  60.0  11.75  485    0.87 0.85   10.72  B    2.8     3
WB  LT       0.24 0.35  60.0  10.46  537    0.05 1.00   10.51  B    1.4     2
WB  TH       0.68 0.35  60.0  12.57  565    2.27 0.85   12.61  B    4.1     5
SB  TH-RT    0.68 0.55  60.0   7.42  718    1.80 0.85    7.83  B    3.7     4

DIR Delay LOS
EB  10.72  B
WB  12.07  B
SB   7.83  B
INTERSECTION DELAY = 10.16 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  16.8 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
BEDFORD/CHAUNCY/LP GARAGE
ALTERNATIVE 1 CONDITIONS: AM PEAK HOUR
date:12-20-1988             time:14:52:43
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I6ALT1A    GEOMETRICS=KBINT6     SIGNAL=KBINT6
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES       # OF LANES      LANE WIDTH      CROSS
DIR  LT    TH    RT    LT  TH  RT      LT    TH    RT     WALK
EB   12    45    13     0   1   0     0.0 14.0   0.0     20
WB  318   229    57     0   1   0     0.0 14.0   0.0     32
NB  103   145   130     0   1   0     0.0 14.0   0.0     32
SB    0     0     0     0   0   0     0.0  0.0   0.0      0

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                 PEDESTRIANS        ARR
DIR GRADE %HV    Y/N MOVES BUSES   PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%    N     0     0   .920  100   N     11.0     3
WB  0.0%  2.0%    N     0     0   .920  300   N     11.0     3
NB  0.0%  2.0%    N     0     0   .920  100   N     11.0     3
SB  0.0%  0.0%          0     0   .000  100   N     11.0     0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *     *  *  *              *           *  38.5   4    A
 2           *           *  *  *  *                 28.5   4    A

CYCLE=  75.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR   LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     12   45   13  .920    13   49   14
WB    318  229   57  .920   346  249   62
NB    103  145  130  .920   112  158  141
SB      0    0    0  .000     0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N    LU     v  Plt  Prt
EB  LT-TH-RT     76 1 1.00    76 0.17 0.19
WB  LT-TH-RT    657 1 1.00   657 0.53 0.09
NB  LT-TH-RT    411 1 1.00   411 0.27 0.34

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN     # LANES      OPPOSING
                 LT   TH   RT      LT   TH   RT          LT  TH  RT     VOLUME
EASTBOUND       346  249   62     100  100  100           0   1   0       311
WESTBOUND        13   49   14     100  100  100           0   1   0        63
NORTHBOUND        0    0    0       0    0    0           0   0   0         0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP   IDEAL N  Fwid   Fhv   Fgr  Fpark  Fbus Farea   Frt   Flt    s
EB  LT-TH-RT   1800  1 1.067 1.000 1.000 1.000 1.000 0.900 0.866 0.889 1330
WB  LT-TH-RT   1800  1 1.067 0.990 1.000 1.000 1.000 0.900 0.883 0.912 1378
NB  LT-TH-RT   1800  1 1.067 0.990 1.000 1.000 1.000 0.900 0.804 0.850 1170
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SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
EB  75  39  1   76   63   13 0.17  1  311 0.53
WB  75  39  1  657  311  346 0.53  1   63 0.17
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
EB 1522 0.204 29.171 0.681 0.171  9.358 0.829  5.657    1.653 0.889 0.889
WB 1619 0.039 37.051 0.836 0.526  1.478 0.474  0.763    1.346 0.912 0.912

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH-RT   76 1330 0.06 0.51  683 0.11
WB  LT-TH-RT  657 1378 0.48 0.51  708 0.93     *
NB  LT-TH-RT  411 1170 0.35 0.38  444 0.92     *

CYCLE= 75.0  LOST= 8.0  SUM V/S CRIT= 0.83 TOTAL V/C= 0.93

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.11 0.51  75.0   7.15  683    0.00 0.85    6.08  B   0.8    1
WB  LT-TH-RT 0.93 0.51  75.0  12.87  708   13.30 0.85   22.24  C   7.4   13
NB  LT-TH-RT 0.92 0.38  75.0  16.90  444   18.10 0.85   29.75  D   6.1   11

DIR Delay LOS
EB   6.08  B
WB  22.24  C
NB  29.75  D
INTERSECTION DELAY = 23.87 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  75.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  62.1 SECONDS
for chosen cycle length  75.0
suggested timing phase 1 is  38.6 secs green,   4.0 secs yellow + red clear
suggested timing phase 2 is  28.4 secs green,   4.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
BEDFORD/CHAUNCY/LP GARAGE
ALTERNATIVE 1 CONDITIONS: PM PEAK HOUR
date:12-20-1988             time:15:07:44
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I6ALT1P    GEOMETRICS=KBINT6     SIGNAL=KBINT6
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES       # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT     LT   TH    RT     WALK
EB   74  286  108     0  1  0    0.0 14.0  0.0     20
WB  306  167   54     0  1  0    0.0 14.0  0.0     32
NB   74  168   79     0  1  0    0.0 14.0  0.0     32
SB    0    0    0     0  0  0    0.0  0.0  0.0      0

TRAFFIC & ROADWAY CONDITIONS
                  ADJ PARK                PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%   N     0     0  .920  100   N     11.0    3
WB  0.0%  2.0%   N     0     0  .920  300   N     11.0    3
NB  0.0%  2.0%   N     0     0  .920  100   N     11.0    3
SB  0.0%  0.0%         0     0  .000  100   N     11.0    0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *     *  *  *              *           *  63.1   4    A
 2           *           *  *  *  *                 28.9   4    A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR   LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     74  286  108  .920    80  311  117
WB    306  167   54  .920   333  182   59
NB     74  168   79  .920    80  183   86
SB      0    0    0  .000     0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU     v  Plt  Prt
EB  LT-TH-RT   509 1 1.00   509 0.16 0.23
WB  LT-TH-RT   573 1 1.00   573 0.58 0.10
NB  LT-TH-RT   349 1 1.00   349 0.23 0.25

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                  OPPOSING APPROACH
BEING OPPOSED        VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                   LT   TH   RT      LT   TH   RT        LT  TH  RT    VOLUME
EASTBOUND         333  182   59     100  100  100         0   1   0      240
WESTBOUND          80  311  117     100  100  100         0   1   0      428
NORTHBOUND          0    0    0       0    0    0         0   0   0        0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt     s
EB  LT-TH-RT  1800  1 1.067 1.000 1.000 1.000 1.000 0.900 0.858 0.915 1356
WB  LT-TH-RT  1800  1 1.067 0.990 1.000 1.000 1.000 0.900 0.881 0.605  913
NB  LT-TH-RT  1800  1 1.067 0.990 1.000 1.000 1.000 0.900 0.832 0.858 1221
```

```
SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
EB 100  63  1  509  428   80 0.16  1  240 0.58
WB 100  63  1  573  240  333 0.58  1  428 0.16
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
EB 1204 0.200 53.879 0.725 0.158  9.201 0.842  5.825    1.552 0.915 0.915
WB 1656 0.259 50.196 0.607 0.581 12.884 0.419  1.439    1.852 0.605 0.605

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH-RT  509 1356 0.38 0.63  855 0.59
WB  LT-TH-RT  573  913 0.63 0.63  576 1.00     *
NB  LT-TH-RT  349 1221 0.29 0.29  353 0.99     *

CYCLE=100.0  LOST= 8.0  SUM V/S CRIT= 0.91 TOTAL V/C= 0.99

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c g/C    C     d1    c      d2   PF  Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.59 0.63 100.0   8.29  855    0.83 0.85    7.75  B   5.2    5
WB  LT-TH-RT 1.00 0.63 100.0  13.91  576   27.66 0.85   35.34  D   8.6   18
NB  LT-TH-RT 0.99 0.29 100.0  26.88  353   33.87 0.85   51.64  E   8.4   16

DIR Delay LOS
EB   7.75  B
WB  35.34  D
NB  51.64  E
INTERSECTION DELAY = 29.50 INTERSECTION LOS=D

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 208.5 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is  63.2 secs green,   4.0 secs yellow + red clear
suggested timing phase 2 is  28.8 secs green,   4.0 secs yellow + red clear
```

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
BEDFORD/CHAUNCY/LP GARAGE
ALTERNATIVE 1 CONDITIONS: SAT PEAK HOUR
date:12-20-1988             time:20:26:19
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I6ALT1S    GEOMETRICS=KBINT6     SIGNAL=KBINT6
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES       # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT     LT TH RT      LT   TH    RT    WALK
EB   33  116   32      0  1  0      0.0 14.0  0.0    20
WB  327  116   96      0  1  0      0.0 14.0  0.0    32
NB   64  136  109      0  1  0      0.0 14.0  0.0    32
SB    0    0    0      0  0  0      0.0  0.0  0.0     0

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK            PEDESTRIANS       ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%   N     0    0   .920  100   N    11.0    3
WB  0.0%  2.0%   N     0    0   .920  300   N    11.0    3
NB  0.0%  2.0%   N     0    0   .920  100   N    11.0    3
SB  0.0%  0.0%         0    0   .000  100   N    11.0    0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *     *  *  *              *           *  32.7   4    A
 2           *           *  *  *  *                 19.3   4    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB    33  116   32  .920    36  126   35
WB   327  116   96  .920   355  126  104
NB    64  136  109  .920    70  148  118
SB     0    0    0  .000     0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU     v  Plt  Prt
EB  LT-TH-RT   197 1 1.00   197 0.18 0.18
WB  LT-TH-RT   586 1 1.00   586 0.61 0.18
NB  LT-TH-RT   336 1 1.00   336 0.21 0.35

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                  OPPOSING APPROACH
BEING OPPOSED        VOLUMES       % OPPOSING LEFT TURN     # LANES      OPPOSING
                  LT   TH   RT        LT   TH   RT         LT  TH  RT     VOLUME
EASTBOUND        355  126  104       100  100  100          0   1   0      230
WESTBOUND         36  126   35       100  100  100          0   1   0      161
NORTHBOUND         0    0    0         0    0    0          0   0   0        0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  LT-TH-RT  1800  1 1.067 1.000 1.000 1.000 1.000 0.900 0.868 0.948 1422
WB  LT-TH-RT  1800  1 1.067 0.990 1.000 1.000 1.000 0.900 0.867 0.841 1249
NB  LT-TH-RT  1800  1 1.067 0.990 1.000 1.000 1.000 0.900 0.802 0.862 1183

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm   Vlt  Plt No   Vo Plto
EB  60  33  1  197  161   36 0.18  1  230 0.61
WB  60  33  1  586  230  355 0.61  1  161 0.18
```

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CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
EB 1412 0.163 27.380 0.731 0.182  5.323 0.818  3.720    1.539 0.948 0.948
WB 1639 0.098 29.732 0.774 0.607  2.971 0.393  0.972    1.453 0.841 0.841

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s v/s   g/C    c  v/c  CRITICAL
EB  LT-TH-RT  197 1422 0.14 0.55  775 0.25
WB  LT-TH-RT  586 1249 0.47 0.55  681 0.86     *
NB  LT-TH-RT  336 1183 0.28 0.32  380 0.88     *

CYCLE= 60.0  LOST= 8.0  SUM V/S CRIT= 0.75 TOTAL V/C= 0.87

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c g/C    C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.25 0.55  60.0   5.48  775    0.04 0.85    4.69  A   1.5    1
WB  LT-TH-RT 0.86 0.55  60.0   8.89  681    7.68 0.85   14.08  B   4.5    8
NB  LT-TH-RT 0.88 0.32  60.0  14.65  380   14.60 0.85   24.86  C   4.2    8

DIR Delay LOS
EB   4.69  A
WB  14.08  B
NB  24.86  C
INTERSECTION DELAY = 15.67 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  38.6 SECONDS
for chosen cycle length  60.0
suggested timing phase 1 is  32.4 secs green,   4.0 secs yellow + red clear
suggested timing phase 2 is  19.6 secs green,   4.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/SURFACE ARTERY/LINCOLN STREETS
ALTERNATIVE 1 CONDITIONS: AM PEAK HOUR
date:01-08-1989             time:14:26:17
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I7ALT1AM   GEOMETRICS=KBINT7MA   SIGNAL=KBINT7MP
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB  149  603  183     1  2  1    12.0 12.0 15.0    52
WB   54 1085   21     0  3  0     0.0 12.0  0.0    30
NB   49  530   13     0  3  0     0.0 11.0  0.0    56
SB   80  770   69     0  3  1     0.0 11.0 15.0    66

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0   10   .870   30   Y    12.0    3
WB  0.0%  2.0%   Y    10   10   .870  200   Y    12.0    3
NB  0.0%  2.0%   N     0   20   .870   90   Y    15.5    3
SB  0.0%  2.0%   N     0   25   .870  380   Y    15.5    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *                          *           *  22.0   4     A
 2           *           *  *  *  *     *  *  *     18.4   4     A
 3           *           *              *  *  *      1.6   0     A
 4        *     *  *  *              *           *  32.0   4     A

CYCLE=  90.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB   149  603  183  .870   171  693  210
WB    54 1085   21  .870    62 1247   24
NB    49  530   13  .870    56  609   15
SB    80  770   69  .870    92  885   79

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU     v  Plt  Prt
EB  LT         171 1 1.00  171 1.00 0.00
EB  TH         693 2 1.05  728 0.00 0.00
EB  RT         210 1 1.00  210 0.00 1.00
WB  LT-TH-RT  1333 3 1.10 1467 0.05 0.02
NB  LT-TH-RT   680 3 1.10  749 0.08 0.02
SB  LT-TH      977 3 1.10 1075 0.09 0.00
SB  RT          79 1 1.00   79 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES      OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT    VOLUME
EASTBOUND        62 1247   24         0    0    0        0   3   0       0
WESTBOUND       171  693  210         0    0    0        1   2   1       0
NORTHBOUND       92  885   79        77   77    0        0   3   1     750
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SOUTHBOUND       56  609   15       100  100  100        0   3   0     680

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  LT        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
EB  TH        1800  2 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3208
EB  RT        1800  1 1.100 0.990 1.000 1.000 0.958 0.900 0.807 1.000 1365
WB  LT-TH-RT  1800  3 1.000 0.990 1.000 0.950 0.986 0.900 0.994 0.991 4439
NB  LT-TH-RT  1800  3 0.967 0.990 1.000 1.000 0.972 0.900 0.995 0.797 3586
SB  LT-TH     1800  3 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.935 4349
SB  RT        1800  1 1.100 0.990 1.000 1.000 0.896 0.900 0.836 1.000 1321

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
NB  90  18  3  680  680   56 0.08  3  750 0.09
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
NB 4731 0.159  4.905 0.406 0.552 13.490 0.448  1.617    2.769 0.392 0.797

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT         171 1524 0.11 0.24  372 0.46
EB  TH         728 3208 0.23 0.24  784 0.93     *
EB  RT         210 1365 0.15 0.64  880 0.24
WB  LT-TH-RT  1467 4439 0.33 0.36 1580 0.93     *
NB  LT-TH-RT   749 3586 0.21 0.20  733 1.02
SB  LT-TH     1075 4349 0.25 0.27 1158 0.93     *
SB  RT          79 1321 0.06 0.27  352 0.23

CYCLE= 90.0  LOST=12.0  SUM V/S CRIT= 0.80 TOTAL V/C= 0.93

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1     c      d2   PF    Delay LOS Avg Q  95% Q
EB  LT        0.46 0.24  90.0  22.00  372     0.66 1.00   22.65  C   3.2     4
EB  TH        0.93 0.24  90.0  25.25  784    12.42 0.85   32.03  D  13.1    19
EB  RT        0.24 0.64  90.0   5.10  880     0.03 0.85    4.36  A   1.9     2
WB  LT-TH-RT  0.93 0.36  90.0  21.18 1580     7.27 0.85   24.19  C  21.5    28
NB  LT-TH-RT  1.02 0.20  90.0  27.36  733    31.07 0.85   49.67  E  16.2    29
SB  LT-TH     0.93 0.27  90.0  24.46 1158     9.28 0.85   28.67  D  17.9    24
SB  RT        0.23 0.27  90.0  19.59  352     0.06 0.85   16.70  C   1.5     2

DIR Delay LOS
EB  25.33  D
WB  24.19  C
NB  49.67  E
SB  27.85  D
INTERSECTION DELAY = 29.67 INTERSECTION LOS=D

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  90.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  78.3 SECONDS
for chosen cycle length  90.0
suggested timing phase 1 is  22.0 secs green,   4.0 secs yellow + red clear
suggested timing phase 2 is  20.1 secs green,   4.0 secs yellow + red clear
suggested timing phase 3 is   0.0 secs green,  -0.1 secs yellow + red clear
suggested timing phase 4 is  32.0 secs green,   4.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/SURFACE ARTERY/LINCOLN STREETS
ALTERNATIVE 1 CONDITIONS: PM PEAK HOUR
date:01-08-1989              time:14:09:34
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I7ALT1PM   GEOMETRICS=KBINT7MP   SIGNAL=KBINT7MP
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES       # OF LANES      LANE WIDTH      CROSS
DIR  LT   TH   RT     LT TH RT      LT   TH   RT      WALK
EB  148  830  683      1  2  1     12.0 12.0 15.0     52
WB   37  525   13      0  2  0      0.0 12.0  0.0     30
NB   40  733   14      0  3  0      0.0 11.0  0.0     56
SB   38 1284   16      0  3  1      0.0 11.0 15.0     66

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                PEDESTRIANS      ARR
DIR GRADE %HV    Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%    N      0    10  .940   15   Y    12.0     3
WB  0.0%  2.0%    Y     10    10  .940  180   Y    12.0     3
NB  0.0%  2.0%    N      0    20  .940  100   Y    15.5     3
SB  0.0%  2.0%    N      0    25  .940  310   Y    15.5     3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *                          *           *  25.8   4    A
 2           *           *  *  *  *     *  *  *     26.4   4    A
 3           *           *              *  *  *      1.6   4    A
 4        *     *  *  *              *           *  20.2   4    A

CYCLE=  90.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF   LTFR THFR RTFR
EB   148  830  683  .940   157  883  727
WB    37  525   13  .940    39  559   14
NB    40  733   14  .940    43  780   15
SB    38 1284   16  .940    40 1366   17

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v   Plt  Prt
EB  LT         157 1 1.00  157 1.00 0.00
EB  TH         883 2 1.05  927 0.00 0.00
EB  RT         727 1 1.00  727 0.00 1.00
WB  LT-TH-RT   612 2 1.05  642 0.06 0.02
NB  LT-TH-RT   837 3 1.10  921 0.05 0.02
SB  LT-TH     1406 3 1.10 1547 0.03 0.00
SB  RT          17 1 1.00   17 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN               OPPOSING APPROACH
BEING OPPOSED       VOLUMES       % OPPOSING LEFT TURN      # LANES      OPPOSING
                  LT   TH   RT       LT    TH    RT       LT  TH  RT      VOLUME
EASTBOUND         39  559   14        0     0     0        0   2   0          0
WESTBOUND        157  883  727        0     0     0        1   2   1          0
NORTHBOUND        40 1366   17       83    83     0        0   3   1       1160
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SOUTHBOUND       43  780   15       100  100  100        0   3   0     837

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv    Fgr Fpark  Fbus Farea   Frt    Flt     s
EB  LT        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
EB  TH        1800  2 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3208
EB  RT        1800  1 1.100 0.990 1.000 1.000 0.958 0.900 0.802 1.000 1357
WB  LT-TH-RT  1800  2 1.000 0.990 1.000 0.925 0.979 0.900 0.993 0.987 2848
NB  LT-TH-RT  1800  3 0.967 0.990 1.000 1.000 0.972 0.900 0.996 0.749 3375
SB  LT-TH     1800  3 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.970 4513
SB  RT        1800  1 1.100 0.990 1.000 1.000 0.896 0.900 0.843 1.000 1332

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
NB  90  26  3  837  837   43 0.05  3 1160 0.03
CALCULATIONS
DIR Sop    Yo     Gu     Fs     Pl     Gq     Pt     Gf       El    Fm    Flt
NB 5079 0.228  7.572 0.150 0.527 18.831 0.473  1.792    7.510 0.248 0.749

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT         157 1524 0.10 0.29  437 0.36
EB  TH         927 3208 0.29 0.29  921 1.01
EB  RT         727 1357 0.54 0.56  754 0.96     *
WB  LT-TH-RT   642 2848 0.23 0.22  638 1.01
NB  LT-TH-RT   921 3375 0.27 0.29  990 0.93
SB  LT-TH     1547 4513 0.34 0.36 1605 0.96     *
SB  RT          17 1332 0.01 0.36  474 0.04

CYCLE= 90.0  LOST= 8.0  SUM V/S CRIT= 0.88 TOTAL V/C= 0.96

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1     c      d2    PF   Delay LOS Avg Q  95% Q
EB  LT        0.36 0.29  90.0  19.39  437    0.23 1.00   19.62  C    2.8     3
EB  TH        1.01 0.29  90.0  24.45  921   24.41 0.85   41.53  E   18.1    31
EB  RT        0.96 0.56  90.0  14.55  754   17.94 0.85   27.61  D    9.6    18
WB  LT-TH-RT  1.01 0.22  90.0  26.59  638   29.08 0.85   47.32  E   14.0    25
NB  LT-TH-RT  0.93 0.29  90.0  23.49  990   10.67 0.85   29.03  D   14.8    21
SB  LT-TH     0.96 0.36  90.0  21.61 1605   11.00 0.85   27.72  D   22.7    33
SB  RT        0.04 0.36  90.0  14.39  474    0.00 0.85   12.23  B    0.3     1

DIR Delay LOS
EB  34.04  D
WB  47.32  E
NB  29.03  D
SB  27.55  D
INTERSECTION DELAY = 32.78 INTERSECTION LOS=D

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  90.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 106.0 SECONDS
for chosen cycle length  90.0
suggested timing phase 1 is  25.8 secs green,   4.0 secs yellow + red clear
suggested timing phase 2 is  26.7 secs green,   4.0 secs yellow + red clear
suggested timing phase 3 is   1.3 secs green,   4.0 secs yellow + red clear
suggested timing phase 4 is  20.2 secs green,   4.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/SURFACE ARTERY/LINCOLN STREETS
ALTERNATIVE 1 CONDITIONS: SAT PEAK HOUR
date:01-08-1989             time:14:16:11
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I7ALT1S    GEOMETRICS=KBINT7MP   SIGNAL=KBINT7MP
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB   46  581  412     1  2  1    12.0 12.0 15.0    52
WB   27  389    3     0  2  0     0.0 12.0  0.0    30
NB   69  486    2     0  3  0     0.0 11.0  0.0    56
SB   22  662   25     0  3  1     0.0 11.0 15.0    66

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0    0   .790   30   Y    12.0    3
WB  0.0%  2.0%   Y    10    0   .790   50   Y    12.0    3
NB  0.0%  2.0%   N     0    0   .790   50   Y    15.5    3
SB  0.0%  2.0%   N     0   10   .790  200   Y    15.5    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *                          *           *  18.0   4    A
 2           *           *  *  *  *     *  *  *     11.7   4    A
 3           *           *              *  *  *      0.1   0    A
 4        *     *  *  *              *           *  14.2   4    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB    46  581  412  .790    58  735  522
WB    27  389    3  .790    34  492    4
NB    69  486    2  .790    87  615    3
SB    22  662   25  .790    28  838   32

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N   LU     v  Plt  Prt
EB  LT          58 1 1.00   58 1.00 0.00
EB  TH         735 2 1.05  772 0.00 0.00
EB  RT         522 1 1.00  522 0.00 1.00
WB  LT-TH-RT   530 2 1.05  557 0.06 0.01
NB  LT-TH-RT   705 3 1.10  776 0.12 0.00
SB  LT-TH      866 3 1.10  952 0.03 0.00
SB  RT          32 1 1.00   32 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT    VOLUME
EASTBOUND        34  492    4         0    0    0        0   2   0       0
WESTBOUND        58  735  522         0    0    0        1   2   1       0
NORTHBOUND       28  838   32        74   74    0        0   3   1     643
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SOUTHBOUND        87  615    3        100  100  100         0   3   0      705

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP    IDEAL N  Fwid    Fhv    Fgr Fpark  Fbus Farea    Frt    Flt    s
EB  LT           1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
EB  TH           1800  2 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3208
EB  RT           1800  1 1.100 0.990 1.000 1.000 1.000 0.900 0.826 1.000 1458
WB  LT-TH-RT  1800  2 1.000 0.990 1.000 0.925 1.000 0.900 0.998 0.989 2927
NB  LT-TH-RT  1800  3 0.967 0.990 1.000 1.000 1.000 0.900 0.999 0.876 4072
SB  LT-TH        1800  3 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.976 4538
SB  RT           1800  1 1.100 0.990 1.000 1.000 0.958 0.900 0.836 1.000 1413

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N    Va    Vm  Vlt   Plt No    Vo Plto
NB  60  12  3  705  705    87 0.12  3   643 0.03
CALCULATIONS
DIR Sop     Yo      Gu     Fs     Pl      Gq    Pt      Gf        El     Fm  Flt
NB 5137 0.125  4.759 0.473 0.552  6.912 0.448  1.521    2.377 0.628 0.876

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v     s  v/s  g/C     c  v/c  CRITICAL
EB  LT          58 1524 0.04 0.30   458 0.13
EB  TH         772 3208 0.24 0.30   964 0.80      *
EB  RT         522 1458 0.36 0.60   881 0.59
WB  LT-TH-RT   557 2927 0.19 0.24   695 0.80      *
NB  LT-TH-RT   776 4072 0.19 0.19   792 0.98
SB  LT-TH      952 4538 0.21 0.26 1189 0.80      *
SB  RT          32 1413 0.02 0.26   370 0.09

CYCLE= 60.0  LOST=12.0  SUM V/S CRIT= 0.64 TOTAL V/C= 0.80

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C      d1     c      d2    PF    Delay LOS Avg Q  95% Q
EB  LT        0.13 0.30  60.0  11.60   458     0.01 1.00   11.61  B    0.7     1
EB  TH        0.80 0.30  60.0  14.69   964     3.44 0.85   15.41  C    8.6    10
EB  RT        0.59 0.60  60.0   5.55   881     0.78 0.85    5.38  B    3.4     3
WB  LT-TH-RT 0.80 0.24  60.0  16.37   695     4.65 0.85   17.87  C    6.7     9
NB  LT-TH-RT 0.98 0.19  60.0  18.27   792    20.13 0.85   32.64  D   11.1    20
SB  LT-TH     0.80 0.26  60.0  15.72 1189     2.83 0.85   15.76  C   10.6    12
SB  RT        0.09 0.26  60.0  12.70   370     0.00 0.85   10.80  B    0.4     1

DIR Delay LOS
EB  11.38  B
WB  17.87  C
NB  32.64  D
SB  15.60  C
INTERSECTION DELAY = 17.99 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  36.9 SECONDS
for chosen cycle length  60.0
suggested timing phase 1 is  18.0 secs green,   4.0 secs yellow + red clear
suggested timing phase 2 is  13.0 secs green,   4.0 secs yellow + red clear
suggested timing phase 3 is   0.0 secs green,  -1.3 secs yellow + red clear
suggested timing phase 4 is  14.2 secs green,   4.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
KINGSTON/ESSEX/AVE DE LAFAYETTE
ALTERNATIVE 1 CONDITIONS: AM PEAK HOUR
date:12-20-1988             time:14:44:31
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I9ALT1A    GEOMETRICS=KBINT9A    SIGNAL=KBINT9
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT    TH    RT     LT  TH  RT     LT    TH    RT     WALK
EB    0   665    44      0   2   1    0.0   9.0   8.0     35
WB    0     0     0      0   0   0    0.0   0.0   0.0     35
NB    0     0     0      0   0   0    0.0   0.0   0.0     33
SB  277   112     0      1   1   0   12.0  12.0   0.0     35

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%   N     0     0  .940  150   Y     15.8    3
WB  0.0%  0.0%   N     0     0  .000  100   Y     15.8    0
NB  0.0%  0.0%   N     0     0  .000  100   Y     12.8    0
SB  0.0%  0.0%   N     0     0  .940  200   Y     12.8    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1     *  *                             *           *  30.8   3    A
 2              *                          *  *        23.2   3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0  665   44  .940     0  707   47
WB     0    0    0  .000     0    0    0
NB     0    0    0  .000     0    0    0
SB   277  112    0  .940   295  119    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N   LU    v  Plt  Prt
EB  TH          707 2 1.05  743 0.00 0.00
EB  RT           47 1 1.00   47 0.00 1.00
SB  LT          295 1 1.00  295 1.00 0.00
SB  TH          119 1 1.00  119 0.00 0.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                  OPPOSING APPROACH
BEING OPPOSED         VOLUMES        % OPPOSING LEFT TURN      # LANES      OPPOSING
                  LT   TH   RT        LT   TH   RT         LT  TH  RT      VOLUME
SOUTHBOUND         0    0    0         0    0    0          0   0   0          0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP   IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  TH         1800  2 0.900 1.000 1.000 1.000 1.000 0.900 1.000 1.000 2916
EB  RT         1800  1 0.867 1.000 1.000 1.000 1.000 0.900 0.802 1.000 1127
SB  LT         1800  1 1.000 1.000 1.000 1.000 1.000 0.900 1.000 0.950 1539
SB  TH         1800  1 1.000 1.000 1.000 1.000 1.000 0.900 1.000 1.000 1620
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CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v     s  v/s  g/C     c  v/c  CRITICAL
EB  TH         743 2916 0.25 0.51 1498 0.50     *
EB  RT          47 1127 0.04 0.51  579 0.08
SB  LT         295 1539 0.19 0.39  594 0.50     *
SB  TH         119 1620 0.07 0.39  626 0.19

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.45 TOTAL V/C= 0.50

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C      d1    c       d2   PF   Delay LOS Avg Q  95% Q
EB  TH       0.50 0.51  60.0   7.23 1498     0.22 0.85    6.34  B    5.7     6
EB  RT       0.08 0.51  60.0   5.62  579     0.00 0.85    4.78  A    0.4     1
SB  LT       0.50 0.39  60.0  10.62  594     0.56 1.00   11.18  B    3.0     4
SB  TH       0.19 0.39  60.0   9.27  626     0.02 0.85    7.90  B    1.2     1

DIR Delay LOS
EB   6.24  B
SB  10.23  B
INTERSECTION DELAY =  7.62 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  11.3 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
KINGSTON/ESSEX/AVE DE LAFAYETTE
ALTERNATIVE 1 CONDITIONS: PM PEAK HOUR
date:12-20-1988             time:14:47:04
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I9ALT1P    GEOMETRICS=KBINT9P    SIGNAL=KBINT9
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB    0 1082  135     0  3  1     0.0  9.0  8.0    35
WB    0    0    0     0  0  0     0.0  0.0  0.0    35
NB    0    0    0     0  0  0     0.0  0.0  0.0    33
SB  594  393    0     1  1  0    12.0 12.0  0.0    35

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%   N     0    0   .960  150   Y    15.8    3
WB  0.0%  0.0%   N     0    0   .000  100   Y    15.8    0
NB  0.0%  0.0%   N     0    0   .000  100   Y    12.8    0
SB  0.0%  0.0%   N     0    0   .960  200   Y    12.8    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1     *  *                          *           *  22.3   3   A
 2           *                          *  *        31.7   3   A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0 1082  135  .960     0 1127  141
WB     0    0    0  .000     0    0    0
NB     0    0    0  .000     0    0    0
SB   594  393    0  .960   619  409    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU     v  Plt  Prt
EB  TH        1127 3 1.10 1240 0.00 0.00
EB  RT         141 1 1.00  141 0.00 1.00
SB  LT         619 1 1.00  619 1.00 0.00
SB  TH         409 1 1.00  409 0.00 0.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT     VOLUME
SOUTHBOUND        0    0    0         0    0    0        0   0   0        0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt     s
EB  TH        1800  3 0.900 1.000 1.000 1.000 1.000 0.900 1.000 1.000 4374
EB  RT        1800  1 0.867 1.000 1.000 1.000 1.000 0.900 0.802 1.000 1127
SB  LT        1800  1 1.000 1.000 1.000 1.000 1.000 0.900 1.000 0.950 1539
SB  TH        1800  1 1.000 1.000 1.000 1.000 1.000 0.900 1.000 1.000 1620
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CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v     s  v/s  g/C    c  v/c  CRITICAL
EB  TH        1240 4374 0.28 0.37 1628 0.76      *
EB  RT         141 1127 0.12 0.37  419 0.34
SB  LT         619 1539 0.40 0.53  812 0.76      *
SB  TH         409 1620 0.25 0.53  855 0.48

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.69 TOTAL V/C= 0.76

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH       0.76 0.37  60.0  12.54 1628     1.53 0.85   11.96  B  11.8   12
EB  RT       0.34 0.37  60.0  10.27  419     0.19 0.85    8.89  B   1.5    2
SB  LT       0.76 0.53  60.0   8.50  812     2.97 1.00   11.47  B   4.9    7
SB  TH       0.48 0.53  60.0   6.80  855     0.34 0.85    6.07  B   3.2    3

DIR Delay LOS
EB  11.65  B
SB   9.32  B
INTERSECTION DELAY = 10.65 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  21.5 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
KINGSTON/ESSEX/AVE DE LAFAYETTE
ALTERNATIVE 1 CONDITIONS: SAT PEAK HOUR]
date:12-20-1988             time:19:53:28
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I9ALT1S    GEOMETRICS=KBINT9A    SIGNAL=KBINT9
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB    0  726   91     0  2  1     0.0  9.0  8.0    35
WB    0    0    0     0  0  0     0.0  0.0  0.0    35
NB    0    0    0     0  0  0     0.0  0.0  0.0    33
SB  318  177    0     1  1  0    12.0 12.0  0.0    35

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%   N     0    0   .940  100   Y    15.8    3
WB  0.0%  0.0%   N     0    0   .000  100   Y    15.8    0
NB  0.0%  0.0%   N     0    0   .000   50   Y    12.8    0
SB  0.0%  0.0%   N     0    0   .940  100   Y    12.8    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1     *  *                          *           *  30.2   3    A
 2           *                          *  *        23.8   3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0  726   91  .940     0  772   97
WB     0    0    0  .000     0    0    0
NB     0    0    0  .000     0    0    0
SB   318  177    0  .940   338  188    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
EB  TH         772 2 1.05  811 0.00 0.00
EB  RT          97 1 1.00   97 0.00 1.00
SB  LT         338 1 1.00  338 1.00 0.00
SB  TH         188 1 1.00  188 0.00 0.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT         LT   TH   RT       LT  TH  RT    VOLUME
SOUTHBOUND        0    0    0          0    0    0        0   0   0       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  TH        1800  2 0.900 1.000 1.000 1.000 1.000 0.900 1.000 1.000 2916
EB  RT        1800  1 0.867 1.000 1.000 1.000 1.000 0.900 0.826 1.000 1160
SB  LT        1800  1 1.000 1.000 1.000 1.000 1.000 0.900 1.000 0.950 1539
SB  TH        1800  1 1.000 1.000 1.000 1.000 1.000 0.900 1.000 1.000 1620

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  TH        811 2916 0.28 0.50 1466 0.55     *
EB  RT         97 1160 0.08 0.50  583 0.17
SB  LT        338 1539 0.22 0.40  611 0.55     *
SB  TH        188 1620 0.12 0.40  644 0.29

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.50 TOTAL V/C= 0.55

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH       0.55 0.50  60.0   7.81 1466   0.36 0.85   6.94  B   6.4    6
EB  RT       0.17 0.50  60.0   6.15  583   0.01 0.85   5.24  B   0.8    1
SB  LT       0.55 0.40  60.0  10.61  611   0.84 1.00  11.46  B   3.4    4
SB  TH       0.29 0.40  60.0   9.37  644   0.08 0.85   8.03  B   1.9    2

DIR Delay LOS
EB   6.76  B
SB  10.23  B
INTERSECTION DELAY =  8.03 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  12.6 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/HARRISON
ALTERNATIVE 1 CONDITIONS: AM PEAK HOUR
date:12-19-1988              time:17:24:14
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I10ALT1A   GEOMETRICS=I10ALT1A   SIGNAL=KBINT10A
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES       # OF LANES     LANE WIDTH      CROSS
DIR  LT   TH   RT     LT TH RT      LT   TH   RT     WALK
EB  508  658  170      0  2  0     0.0  9.0  0.0     36
WB    0    0    0      0  0  0     0.0  0.0  0.0     34
NB    0    0    0      0  0  0     0.0  0.0  0.0     58
SB   60   81    0      1  1  0     9.0 11.0  0.0     29

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                PEDESTRIANS        ARR
DIR GRADE %HV    Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%    Y     0     0  .910  100   Y    16.0    3
WB  0.0%  0.0%    N     0     0  .000  100   Y    16.0    0
NB  0.0%  0.0%    N     0     0  .000  100   Y    21.5    0
SB  0.0%  0.0%    N     0     0  .910  100   Y    21.5    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *                                         48.8   3    A
 2                                      *  *         5.2   3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF   LTFR THFR RTFR
EB   508  658  170  .910   558  723  187
WB     0    0    0  .000     0    0    0
NB     0    0    0  .000     0    0    0
SB    60   81    0  .910    66   89    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU     v  Plt  Prt
EB  LT-TH-RT  1468 2 1.05 1542 0.38 0.13
SB  LT          66 1 1.00   66 1.00 0.00
SB  TH          89 1 1.00   89 0.00 0.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                 OPPOSING APPROACH
BEING OPPOSED        VOLUMES       % OPPOSING LEFT TURN     # LANES     OPPOSING
                  LT   TH   RT        LT   TH   RT        LT  TH  RT    VOLUME
EASTBOUND          0    0    0         0    0    0         0   0   0       0
SOUTHBOUND         0    0    0         0    0    0         0   0   0       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  LT-TH-RT  1800  2 0.900 1.000 1.000 1.000 1.000 0.900 0.981 1.000 2860
SB  LT        1800  1 0.900 1.000 1.000 1.000 1.000 0.900 1.000 0.950 1385
SB  TH        1800  1 0.967 1.000 1.000 1.000 1.000 0.900 1.000 1.000 1566
```

```
CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH-RT 1542 2860 0.54 0.81 2329 0.66     *
SB  LT         66 1385 0.05 0.09  119 0.55
SB  TH         89 1566 0.06 0.09  134 0.66     *

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.60 TOTAL V/C= 0.66

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.66 0.81  60.0   1.71 2329    0.51 0.85    1.88  A   4.5
SB  LT       0.55 0.09  60.0  20.00  119    4.10 1.00   24.10  C   1.0
SB  TH       0.66 0.09  60.0  20.20  134    7.68 0.85   23.70  C   1.4

DIR Delay LOS
EB   1.88  A
SB  23.87  C
INTERSECTION DELAY =  3.89 INTERSECTION LOS=A

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  16.1 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/HARRISON
ALTERNATIVE 1 CONDITIONS: PM PEAK HOUR
date:12-19-1988             time:17:30:47
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I10ALTP    GEOMETRICS=KBINT10P   SIGNAL=KBINT10
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES          # OF LANES      LANE WIDTH      CROSS
DIR  LT   TH    RT     LT TH RT      LT    TH    RT     WALK
EB  378 1051   271      1  2  1     8.0   9.0   8.0     36
WB    0     0    0      0  0  0     0.0   0.0   0.0     34
NB    0     0    0      0  0  0     0.0   0.0   0.0     58
SB  194   198    0      1  1  0     9.0  11.0   0.0     29

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%   Y     0    0  .910  100   Y    13.0    3
WB  0.0%  0.0%   N     0    0  .000  100   Y    13.0    0
NB  0.0%  0.0%   N     0    0  .000  100   Y    18.5    0
SB  0.0%  0.0%   N     0    0  .910  100   Y    18.5    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *                          *           * 39.4   3    A
 2           *           *              *  *       14.6   3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB   378 1051  271  .910   415 1155  298
WB     0    0    0  .000     0    0    0
NB     0    0    0  .000     0    0    0
SB   194  198    0  .910   213  218    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU     v  Plt  Prt
EB  LT         415 1 1.00   415 1.00 0.00
EB  TH        1155 2 1.05  1213 0.00 0.00
EB  RT         298 1 1.00   298 0.00 1.00
SB  LT         213 1 1.00   213 1.00 0.00
SB  TH         218 1 1.00   218 0.00 0.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN     # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT        LT  TH  RT     VOLUME
EASTBOUND         0    0    0         0    0    0         0   0   0        0
SOUTHBOUND        0    0    0         0    0    0         0   0   0        0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid    Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  LT        1800  1 0.867 1.000 1.000 1.000 1.000 0.900 1.000 0.950 1334
EB  TH        1800  2 0.900 1.000 1.000 1.000 1.000 0.900 1.000 1.000 2916
EB  RT          1800  1 0.867 1.000 1.000 1.000 1.000 0.900 0.802 1.000 1127
SB  LT          1800  1 0.900 1.000 1.000 1.000 1.000 0.900 1.000 0.950 1385
SB  TH          1800  1 0.967 1.000 1.000 1.000 1.000 0.900 1.000 1.000 1566
.
CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v     s  v/s  g/C     c  v/c  CRITICAL
EB  LT          415 1334 0.31 0.66   876 0.47
EB  TH         1213 2916 0.42 0.66  1915 0.63      *
EB  RT          298 1127 0.26 0.66   740 0.40
SB  LT          213 1385 0.15 0.24   337 0.63      *
SB  TH          218 1566 0.14 0.24   381 0.57

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.57 TOTAL V/C= 0.63

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C      d1     c       d2   PF   Delay LOS Avg Q  95% Q
EB  LT       0.47 0.66  60.0    3.90  876     0.32 1.00    4.22  A   2.4
EB  TH       0.63 0.66  60.0    4.60 1915     0.49 0.85    4.33  A   6.6
EB  RT       0.40 0.66  60.0    3.65  740     0.20 0.85    3.27  A   1.7
SB  LT       0.63 0.24  60.0   15.44  337     2.70 1.00   18.14  C   2.7
SB  TH       0.57 0.24  60.0   15.17  381     1.54 0.85   14.20  B   2.7

DIR Delay LOS
EB   4.14  A
SB  16.15  C
INTERSECTION DELAY =  6.33 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  15.0 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/HARRISON
ALTERNATIVE 1 CONDITIONS: SAT PEAK HOUR
date:12-20-1988              time:19:59:18
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I10ALT1S   GEOMETRICS=KBINT10A   SIGNAL=KBINT10
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES       # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT     LT    TH    RT    WALK
EB  348  695  245     0  2  0     0.0  9.0  0.0     36
WB    0    0    0     0  0  0     0.0  0.0  0.0     34
NB    0    0    0     0  0  0     0.0  0.0  0.0     58
SB  165  117    0     1  1  0     9.0 11.0  0.0     29

TRAFFIC & ROADWAY CONDITIONS
                  ADJ PARK                PEDESTRIANS      ARR
DIR GRADE %HV    Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%    Y     0     0   .910  200   Y    13.0    3
WB  0.0%  0.0%    N     0     0   .000  200   Y    13.0    0
NB  0.0%  0.0%    N     0     0   .000  100   Y    18.5    0
SB  0.0%  0.0%    N     0     0   .910  100   Y    18.5    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *                             *           *  43.8   3    A
 2           *           *                 *  *        10.2   3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB   348  695  245  .910   382  764  269
WB     0    0    0  .000     0    0    0
NB     0    0    0  .000     0    0    0
SB   165  117    0  .910   181  129    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N    LU    v  Plt  Prt
EB  LT-TH-RT   1415 2 1.05 1486 0.27 0.19
SB  LT          181 1 1.00  181 1.00 0.00
SB  TH          129 1 1.00  129 0.00 0.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN      # LANES      OPPOSING
                  LT   TH   RT        LT   TH   RT        LT  TH  RT     VOLUME
EASTBOUND          0    0    0         0    0    0         0   0   0        0
SOUTHBOUND         0    0    0         0    0    0         0   0   0        0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP   IDEAL N  Fwid   Fhv    Fgr  Fpark  Fbus  Farea   Frt   Flt     s
EB  LT-TH-RT   1800  2 0.900 0.990 1.000 1.000 1.000 0.900 0.962 0.947 2630
SB  LT         1800  1 0.900 1.000 1.000 1.000 1.000 0.900 1.000 0.950 1385
SB  TH         1800  1 0.967 1.000 1.000 1.000 1.000 0.900 1.000 1.000 1566

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH-RT 1486 2630 0.57 0.73 1922 0.77     *
SB  LT        181 1385 0.13 0.17  234 0.77     *
SB  TH        129 1566 0.08 0.17  265 0.48
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CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.70 TOTAL V/C= 0.77

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C      d1    c      d2   PF    Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.77 0.73  60.0   3.80 1922    1.43 0.85    4.44  A   6.4    6
SB  LT       0.77 0.17  60.0  18.10  234    9.93 1.00   28.04  D   2.7    5
SB  TH       0.48 0.17  60.0  17.14  265    1.13 0.85   15.53  C   1.8    2

DIR Delay LOS
EB   4.44  A
SB  22.85  C
INTERSECTION DELAY =  7.62 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  22.4 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/WASHINGTON
ALTERNATIVE 1 CONDITIONS: AM PEAK HOUR
date:12-16-1988             time:14:53:06
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I11ALT1A   GEOMETRICS=KBINT11    SIGNAL=KBINT11
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT    TH    RT    LT TH RT      LT    TH    RT    WALK
EB  149  793    0     1  2  0    11.0 11.0  0.0    28
WB    0    0    0     0  0  0     0.0  0.0  0.0    31
NB    0  459  553     0  2  1     0.0 11.0 11.0    36
SB    0    0    0     0  0  0     0.0  0.0  0.0    36

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                PEDESTRIANS         ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0    0   .930  200    Y    11.8     3
WB  0.0%  0.0%         0    0   .000  200         11.8     0
NB  0.0%  2.0%   N     0    0   .930  550    Y    13.0     3
SB  0.0%  0.0%         0    0   .000  750    Y    13.0     3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN   Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *                               *           *  19.6   3     A
 2           *           *     *  *                   34.4   3     A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB   149  793    0  .930   160  853    0
WB     0    0    0  .000     0    0    0
NB     0  459  553  .930     0  494  595
SB     0    0    0  .000     0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N    LU     v  Plt  Prt
EB  LT          160 1 1.00  160 1.00 0.00
EB  TH          853 2 1.05  895 0.00 0.00
NB  TH          494 2 1.05  518 0.00 0.00
NB  RT          595 1 1.00  595 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                 OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN     # LANES     OPPOSING
                 LT   TH   RT         LT   TH   RT        LT  TH  RT     VOLUME
EASTBOUND          0    0    0         0    0    0         0   0   0         0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  LT         1800  1 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1473
EB  TH         1800  2 0.967 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3101
NB  TH         1800  2 0.967 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3101
NB  RT         1800  1 0.967 0.990 1.000 1.000 1.000 0.900 0.755 1.000 1170

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT         160 1473 0.11 0.33  480 0.33
EB  TH         895 3101 0.29 0.33 1011 0.89     *
NB  TH         518 3101 0.17 0.57 1780 0.29
NB  RT         595 1170 0.51 0.57  672 0.89      *

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.80 TOTAL V/C= 0.89

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c     d2   PF   Delay LOS Avg Q  95% Q
EB  LT       0.33 0.33  60.0  11.62  480   0.16 1.00  11.78  B   1.8
EB  TH       0.89 0.33  60.0  14.56 1011   6.80 0.85  18.15  C   9.6
NB  TH       0.29 0.57  60.0   4.97 1780   0.03 0.85   4.25  A   3.5
NB  RT       0.89 0.57  60.0   8.42  672   9.55 0.85  15.27  C   4.6

DIR Delay LOS
EB  17.19  C
NB  10.14  B
INTERSECTION DELAY = 13.57 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  37.2 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/WASHINGTON
ALTERNATIVE 1 CONDITIONS: PM PEAK HOUR
date:01-11-1989                 time:08:13:15
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I11ALT1P   GEOMETRICS=KBINT11M   SIGNAL=KBINT11
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES        # OF LANES      LANE WIDTH      CROSS
DIR  LT    TH    RT     LT TH RT      LT    TH    RT     WALK
EB  124   967     0      0  3  0     0.0 11.0  0.0     28
WB    0     0     0      0  0  0     0.0  0.0  0.0     31
NB    0   231   732      0  2  1     0.0 11.0 11.0     36
SB    0     0     0      0  0  0     0.0  0.0  0.0     36

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                      PEDESTRIANS        ARR
DIR GRADE %HV    Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%    N      0     0  .910  200   Y     11.8    3
WB  0.0%  0.0%           0     0  .000  200         11.8    0
NB  0.0%  2.0%    N      0     0  .910  590   Y     13.0    3
SB  0.0%  0.0%           0     0  .000  750   Y     13.0    3

PHASINGS
    EASTBOUND    WESTBOUND    NORTHBOUND   SOUTHBOUND GREEN  Y+R PRE/ACT
    l t r p  l t r p  l t r p  l t r p
 1  *                          *                   *  28.6   3    A
 2           *            *       *  *                65.4   3    A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR   LTV   THV   RTV    PHF   LTFR THFR RTFR
EB    124   967     0  .910    136 1063    0
WB      0     0     0  .000      0    0    0
NB      0   231   732  .910      0  254  804
SB      0     0     0  .000      0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N    LU     v   Plt   Prt
EB  LT-TH      1199 3 1.10  1319 0.11 0.00
NB  TH          254 2 1.05   267 0.00 0.00
NB  RT          804 1 1.00   804 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                  OPPOSING APPROACH
BEING OPPOSED       VOLUMES       % OPPOSING LEFT TURN     # LANES      OPPOSING
                  LT    TH    RT        LT    TH    RT       LT  TH  RT    VOLUME
EASTBOUND          0     0     0         0     0     0        0   0   0        0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP   IDEAL N  Fwid   Fhv    Fgr  Fpark  Fbus  Farea   Frt    Flt     s
EB  LT-TH      1800  3 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.942 4383
NB  TH         1800  2 0.967 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3101
NB  RT         1800  1 0.967 0.990 1.000 1.000 1.000 0.900 0.755 1.000 1170

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v     s  v/s  g/C     c  v/c  CRITICAL
EB  LT-TH     1319 4383 0.30 0.29 1254 1.05     *
NB  TH         267 3101 0.09 0.65 2027 0.13
NB  RT         804 1170 0.69 0.65  765 1.05     *

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.99 TOTAL V/C= 1.05
```

```
LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH    1.05 0.29 100.0  27.69 1254   34.03 0.85   52.46  E  29.4   53
NB  TH       0.13 0.65 100.0   4.98 2027    0.00 0.85    4.24  A   2.4    2
NB  RT       1.05 0.65 100.0  14.57  765   39.81 0.85   46.22  E  14.2   32

DIR Delay LOS
EB  52.46  E
NB  35.77  D
INTERSECTION DELAY = 44.98 INTERSECTION LOS=E

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

THE V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/WASHINGTON
ALTERNATIVE 1 CONDITIONS: SAT PEAK HOUR
date:12-20-1988               time:20:16:30
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I11ALT1S   GEOMETRICS=KBINT11    SIGNAL=KBINT11
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES        # OF LANES      LANE WIDTH      CROSS
DIR  LT   TH    RT     LT  TH  RT      LT    TH    RT     WALK
EB  144  896     0      1   2   0     11.0 11.0  0.0     28
WB    0    0     0      0   0   0      0.0  0.0  0.0     31
NB    0  300   379      0   2   1      0.0 11.0 11.0     36
SB    0    0     0      0   0   0      0.0  0.0  0.0     36

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                PEDESTRIANS       ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0     0  .930  200   Y     11.8    3
WB  0.0%  0.0%         0     0  .000  200         11.8    0
NB  0.0%  2.0%   N     0    10  .930  550   Y     13.0    3
SB  0.0%  0.0%         0     0  .000  750   Y     13.0    3

PHASINGS
    EASTBOUND    WESTBOUND    NORTHBOUND   SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *                             *           *  25.5   3    A
 2           *           *     *  *                 28.5   3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB   144  896    0  .930   155  963    0
WB     0    0    0  .000     0    0    0
NB     0  300  379  .930     0  323  408
SB     0    0    0  .000     0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU     v  Plt  Prt
EB  LT         155 1 1.00   155 1.00 0.00
EB  TH         963 2 1.05  1012 0.00 0.00
NB  TH         323 2 1.05   339 0.00 0.00
NB  RT         408 1 1.00   408 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                 OPPOSING APPROACH
BEING OPPOSED       VOLUMES     % OPPOSING LEFT TURN     # LANES     OPPOSING
                  LT   TH   RT       LT   TH   RT        LT  TH  RT     VOLUME
EASTBOUND          0    0    0        0    0    0         0   0   0          0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv    Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  LT         1800  1 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1473
EB  TH         1800  2 0.967 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3101
NB  TH         1800  2 0.967 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3101
NB  RT         1800  1 0.967 0.990 1.000 1.000 0.958 0.900 0.755 1.000 1121

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT         155 1473 0.11 0.43   627 0.25
EB  TH        1012 3101 0.33 0.4[illegible] [illegible]20 0.77        *
NB  TH         339 3101 0.11 0.47  1471 0.23
NB  RT        408 1121 0.36 0.47  532 0.77     *

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.69 TOTAL V/C= 0.77

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c g/C    C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT        0.25 0.43  60.0   8.40  627    0.04 1.00    8.45  B   1.5     2
EB  TH        0.77 0.43  60.0  11.16 1320    1.94 0.85   11.13  B   9.2    10
NB  TH        0.23 0.47  60.0   7.08 1471    0.01 0.85    6.03  B   2.8     3
NB  RT        0.77 0.47  60.0   9.90  532    4.57 0.85   12.30  B   3.6     5

DIR Delay LOS
EB  10.78  B
NB   9.45  B
INTERSECTION DELAY = 10.26 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  21.9 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:12-16-1988             TIME:14:55:28
BEACH/HARRISON ALTERNATIVE 1 CONDITIONS: AM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=I12ALT1A   GEOMETRICS=KBINT12A
KEY:   D
       |
     A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
          FROM D: YIELD
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: BEACH WB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: BEACH EB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: HARRISON NB B: HARRISON SB C: BEACH WB    D: BEACH EB
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: HARRISON NB B: HARRISON SB C: BEACH WB    D: BEACH EB
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0    0    1    0  211   39   70   35    0    0    0    1
PHF               0.88           0.88           0.88           0.88
ADJ VOLUME        0    0    1    0  240   44   80   40    0    0    0    1
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR       0              0             88   44    0    0    0    1

STEP 1 RIGHT TURNS FROM     C:BEACH WB               D:BEACH EB
CONFLICTING FLOWS                        1                 142
CRITICAL GAPS                          5.0                 4.5
CAPACITY                              1199                1154
CAPACITY USED                            0%                  0%
IMPEDANCE FACTOR                      1.00                1.00
ACTUAL CAPACITY                       1199                1154
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1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:12-16-1988             TIME:14:55:28
BEACH/HARRISON ALTERNATIVE 1 CONDITIONS: AM PEAK HOUR

STEP 2 LEFT TURNS FROM     B:HARRISON SB              A:HARRISON NB
CONFLICTING FLOWS                         1                   284
CRITICAL GAPS                           4.5                   4.5
CAPACITY                               1308                  1013
CAPACITY USED                             0%                    0%
IMPEDANCE FACTOR                       1.00                  1.00
ACTUAL CAPACITY                        1308                  1013


STEP 3 THRU MOVES FROM     C:BEACH WB                 D:BEACH EB
CONFLICTING FLOWS                       285                   263
CRITICAL GAPS                           5.5                   5.0
CAPACITY                                807                   921
CAPACITY USED                             5%                    0%
IMPEDANCE FACTOR                       0.97                  1.00
ACTUAL CAPACITY                         807                   921


STEP 4 LEFT TURNS FROM     C:BEACH WB                 D:BEACH EB
CONFLICTING FLOWS                       286                   303
CRITICAL GAPS                           6.0                   5.5
CAPACITY                                726                   790
ACTUAL CAPACITY                         725                   767


                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT               DEMAND    CAPACITY  RESERVE    LOS  AVG DEL(SEC) AVG QUEU


ALL MOVES FROM C:        131        751       619      A      5.81         0.21

ALL MOVES FROM D:          1       1154      1153      A      3.12         0.00
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:12-19-1988             TIME:13:14:34
BEACH/HARRISON ALTERNATIVE 1 CONDITIONS: PM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=I12ALT1P   GEOMETRICS=KBINT12
KEY:   D
       |
     A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
          FROM D: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 4 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: BEACH ST. WB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: BEACH ST EB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: HARRISON AV B: HARRISON AV C: BEACH ST. W D: BEACH ST EB
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: HARRISON AV B: HARRISON AV C: BEACH ST. W D: BEACH ST EB
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0    0    1    0  362  110  148   70    0    0    0    1
PHF               0.92           0.92           0.92           0.92
ADJ VOLUME        0    0    1    0  393  120  161   76    0    0    0    1
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR       0              0            177   84    0    0    0    1


STEP 1 RIGHT TURNS FROM     C:BEACH ST. WB           D:BEACH ST EB
CONFLICTING FLOWS                        1                 257
CRITICAL GAPS                          5.0                 5.0
CAPACITY                              1199                 927
CAPACITY USED                            0%                  0%
IMPEDANCE FACTOR                      1.00                1.00
ACTUAL CAPACITY                       1199                 927
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1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:12-19-1988               TIME:13:14:34
BEACH/HARRISON ALTERNATIVE 1 CONDITIONS: PM PEAK HOUR

STEP 2 LEFT TURNS FROM     B:HARRISON AVE S         A:HARRISON AVE N
CONFLICTING FLOWS                         1                     513
CRITICAL GAPS                           5.0                     5.0
CAPACITY                               1199                     704
CAPACITY USED                            0%                      0%
IMPEDANCE FACTOR                       1.00                    1.00
ACTUAL CAPACITY                        1199                     704


STEP 3 THRU MOVES FROM     C:BEACH ST. WB           D:BEACH ST EB
CONFLICTING FLOWS                       514                     454
CRITICAL GAPS                           6.0                     6.0
CAPACITY                                541                     584
CAPACITY USED                           15%                      0%
IMPEDANCE FACTOR                       0.90                    1.00
ACTUAL CAPACITY                         541                     584


STEP 4 LEFT TURNS FROM     C:BEACH ST. WB           D:BEACH ST EB
CONFLICTING FLOWS                       515                     530
CRITICAL GAPS                           6.5                     6.5
CAPACITY                                477                     466
ACTUAL CAPACITY                         477                     418


                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT               DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUEU


ALL MOVES FROM C:        261        495       235     C     15.34          1.11

ALL MOVES FROM D:          1        927       926     A      3.89          0.00
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:12-20-1988             TIME:20:20:01
BEACH/HARRISON ALTERNATIVE 1 CONDITIONS: SAT PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=I12ALT1S   GEOMETRICS=KBINT12
KEY:   D
       |
     A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
          FROM D: YIELD
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 4 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: BEACH WB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: BEACH EB
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: HARRISON NB B: HARRISON SB C: BEACH WB    D: BEACH EB
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: HARRISON NB B: HARRISON SB C: BEACH WB    D: BEACH EB
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0    0    1    0  273   89   82   66    0    0    0    1
PHF               0.88           0.88           0.88           0.88
ADJ VOLUME        0    0    1    0  310  101   93   75    0    0    0    1
PERCENT GRADE     0.00           0.00           0.00
PASS CAR/HR       0              0            103   83    0    0    0    1

STEP 1 RIGHT TURNS FROM     C:BEACH WB               D:BEACH EB
CONFLICTING FLOWS                        1                 206
CRITICAL GAPS                          5.0                 4.5
CAPACITY                              1199                1089
CAPACITY USED                            0%                  0%
IMPEDANCE FACTOR                      1.00                1.00
ACTUAL CAPACITY                       1199                1089
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1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:12-20-1988            TIME:20:20:01
BEACH/HARRISON ALTERNATIVE 1 CONDITIONS: SAT PEAK HOUR

STEP 2 LEFT TURNS FROM     B:HARRISON SB            A:HARRISON NB
CONFLICTING FLOWS                        1                  411
CRITICAL GAPS                          5.0                  5.0
CAPACITY                              1199                  787
CAPACITY USED                            0%                   0%
IMPEDANCE FACTOR                      1.00                 1.00
ACTUAL CAPACITY                       1199                  787

STEP 3 THRU MOVES FROM     C:BEACH WB               D:BEACH EB
CONFLICTING FLOWS                      412                  362
CRITICAL GAPS                          6.0                  5.5
CAPACITY                               618                  737
CAPACITY USED                           13%                   0%
IMPEDANCE FACTOR                      0.91                 1.00
ACTUAL CAPACITY                        618                  737

STEP 4 LEFT TURNS FROM     C:BEACH WB               D:BEACH EB
CONFLICTING FLOWS                      413                  437
CRITICAL GAPS                          6.5                  6.0
CAPACITY                               551                  598
ACTUAL CAPACITY                        551                  546

                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT               DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUEUE

ALL MOVES FROM C:        185        579       394     B      9.15         0.47

ALL MOVES FROM D:          1       1089      1088     A      3.31         0.00
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
CHAUNCY/AVE DE LAFAYETTE
ALTERNATIVE 1 CONDITIONS: AM PEAK HOUR
date:01-06-1989             time:10:08:27
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I13ALT1A   GEOMETRICS=KBINT13    SIGNAL=KBINT13
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT       LT   TH   RT    WALK
EB    0    0    0     0  0  0    0.0  0.0  0.0     44
WB    0   45    7     0  2  0    0.0 11.0  0.0     44
NB  155  365    0     1  1  0   11.0 10.0  0.0     40
SB    0    0  337     0  0  1    0.0  0.0 14.0     36

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%         0    0  .000  100   N    15.0     0
WB  0.0%  2.0%    Y    0    0  .940  100   N    15.0     3
NB  0.0%  2.0%    Y    0    0  .940  100   N    14.0     3
SB  0.0%  2.0%    N    0    0  .940  100   N    14.0     3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1                 *  *              *           *   3.7    3    A
 2           *           *  *  *              *     50.3    3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0    0    0 .000     0    0    0
WB     0   45    7 .940     0   48    7
NB   155  365    0 .940   165  388    0
SB     0    0  337 .940     0    0  359

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
WB  TH-RT       55 2 1.05   58 0.00 0.13
NB  LT         165 1 1.00  165 1.00 0.00
NB  TH         388 1 1.00  388 0.00 0.00
SB  RT         359 1 1.00  359 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT    VOLUME
NORTHBOUND        0    0  359       100    0    0        0   0   1        0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt     s
WB  TH-RT      1800  2 0.967 0.990 1.000 1.000 1.000 0.900 0.973 1.000 3018
NB  LT         1800  1 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1473
NB  TH         1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
SB  RT         1800  1 1.067 0.990 1.000 1.000 1.000 0.900 0.802 1.000 1373

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP      v     s v/s  g/C    c  v/c  CRITICAL
WB  TH-RT        58 3018 0.02 0.06  186 0.31     *
NB  LT          165 1473 0.11 0.84 1235 0.13
NB  TH          388 1497 0.26 0.84 1255 0.31
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SB  RT          359 1373 0.26 0.84 1151 0.31      *

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.28 TOTAL V/C= 0.31

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1     c      d2   PF   Delay LOS Avg Q  95% Q
WB  TH-RT     0.31 0.06  60.0  20.46  186    0.32 0.85  17.67  C    0.9     1
NB  LT        0.13 0.84  60.0   0.67 1235    0.00 1.00   0.67  A    0.4     1
NB  TH        0.31 0.84  60.0   0.81 1255    0.05 0.85   0.72  A    1.0     1
SB  RT        0.31 0.84  60.0   0.81 1151    0.05 0.85   0.73  A    1.0     1

DIR Delay LOS
WB  17.67  C
NB   0.71  A
SB   0.73  A
INTERSECTION DELAY =  1.73 INTERSECTION LOS=A

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE   8.5 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
CHAUNCY/AVE DE LAFAYETTE
ALTERNATIVE 1 CONDITIONS: PM PEAK HOUR
date:01-06-1989             time:10:16:44
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I13ALT1P   GEOMETRICS=KBINT13    SIGNAL=KBINT13
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT  TH    RT    LT TH RT      LT   TH   RT    WALK
EB    0    0    0     0  0  0     0.0  0.0  0.0    44
WB    0   64   22     0  2  0     0.0 11.0  0.0    44
NB  100  300    0     1  1  0    11.0 10.0  0.0    40
SB    0    0  424     0  0  1     0.0  0.0 14.0    36

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS       ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%         0    0  .000  100   N    15.0    0
WB  0.0%  2.0%   Y     0    0  .960  100   N    15.0    3
NB  0.0%  2.0%   Y     0    0  .960  100   N    14.0    3
SB  0.0%  2.0%   N     0    0  .960  100   N    14.0    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1                 *  *              *           *   4.9   3    A
 2           *           *  *  *              *     49.1   3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0    0    0  .000     0    0    0
WB     0   64   22  .960     0   67   23
NB   100  300    0  .960   104  313    0
SB     0    0  424  .960     0    0  442

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU     v  Plt  Prt
WB  TH-RT       90 2 1.05   94 0.00 0.26
NB  LT         104 1 1.00  104 1.00 0.00
NB  TH         313 1 1.00  313 0.00 0.00
SB  RT         442 1 1.00  442 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN     # LANES     OPPOSING
                 LT   TH   RT        LT    TH    RT        LT  TH  RT       VOLUME
NORTHBOUND        0    0  442       100     0     0         0   0   1         0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
WB  TH-RT      1800  2 0.967 0.990 1.000 1.000 1.000 0.900 0.949 1.000 2944
NB  LT         1800  1 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1473
NB  TH         1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
SB  RT         1800  1 1.067 0.990 1.000 1.000 1.000 0.900 0.802 1.000 1373

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
WB  TH-RT      94 2944 0.03 0.08  239 0.39     *
NB  LT        104 1473 0.07 0.82 1206 0.09
NB  TH        313 1497 0.21 0.82 1226 0.25
```

```
SB  RT        442 1373 0.32 0.82 1124 0.39     *

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.35 TOTAL V/C= 0.39

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1     c       d2   PF   Delay LOS Avg Q  95% Q
WB  TH-RT    0.39 0.08  60.0  19.88  239     0.57 0.85   17.38  C   1.4    2
NB  LT       0.09 0.82  60.0   0.81 1206     0.00 1.00    0.81  A   0.3    1
NB  TH       0.25 0.82  60.0   0.95 1226     0.03 0.85    0.83  A   0.9    1
SB  RT       0.39 0.82  60.0   1.10 1124     0.12 0.85    1.04  A   1.3    1

DIR Delay LOS
WB  17.38  C
NB   0.82  A
SB   1.04  A
INTERSECTION DELAY =  2.56 INTERSECTION LOS=A

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE   9.6 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:01-08-1989             TIME:20:07:05
KINGSTON/KBE GARAGE - ALTERNATIVE 1 CONDITIONS: AM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=I14ALT1A   GEOMETRICS=KBINT14
KEY:   D
       |
     A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
          FROM D: YIELD
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: KBE GARAGE
EXCLUSIVE LEFT TURN LANES: YES
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D:
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: KINGSTON NB B: KINGSTON SB C: KBE GARAGE  D:
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.50           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: KINGSTON NB B: KINGSTON SB C: KBE GARAGE  D:
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0    0    1  125  365    0   45   30    0    0    0    1
PHF               0.94           0.94           0.94           0.94
ADJ VOLUME        0    0    1  133  388    0   48   32    0    0    0    1
PERCENT GRADE     0.00          -1.00           2.00
PERCENT CYCLES      0.00           0.00           0.00           0.00
PASSENGER CARS      0.00          98.00          %100.00           0.00
PERCENT LT TRU      0.00           0.00           0.00           0.00
PERCENT HV TRU      0.00           2.00           0.00           0.00
PASS CAR/HR       0            129             57   38    0    0    0    1

STEP 1 RIGHT TURNS FROM     C:KBE GARAGE             D:
CONFLICTING FLOWS                        1                 194
CRITICAL GAPS                          5.0                 4.5
CAPACITY                              1199                1101
CAPACITY USED                            0%                  0%
IMPEDANCE FACTOR                      1.00                1.00
ACTUAL CAPACITY                       1199                1101
```

```
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:01-08-1989             TIME:20:07:05
KINGSTON/KBE GARAGE - ALTERNATIVE 1 CONDITIONS: AM PEAK HOUR

STEP 2 LEFT TURNS FROM     B:KINGSTON SB            A:KINGSTON NB
CONFLICTING FLOWS                        1                  388
CRITICAL GAPS                          4.5                  4.5
CAPACITY                              1308                  917
CAPACITY USED                          10%                   0%
IMPEDANCE FACTOR                      0.94                 1.00
ACTUAL CAPACITY                       1308                  917

STEP 3 THRU MOVES FROM     C:KBE GARAGE             D:
CONFLICTING FLOWS                      522                  522
CRITICAL GAPS                          6.0                  5.0
CAPACITY                               535                  697
CAPACITY USED                           7%                   0%
IMPEDANCE FACTOR                      0.96                 1.00
ACTUAL CAPACITY                        503                  655

STEP 4 LEFT TURNS FROM     C:KBE GARAGE             D:
CONFLICTING FLOWS                      523                  554
CRITICAL GAPS                          6.0                  5.5
CAPACITY                               534                  585
ACTUAL CAPACITY                        502                  528

                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT               DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC)  AVG QUEU

LT FROM B:               129       1308       1179    A      3.05         0.11

LT FROM C:                57        502        444    A      8.10         0.13
SHARED TH/RT FROM C:      38        503        464    A      7.75         0.08

ALL MOVES FROM D:          1       1101       1100    A      3.27         0.00
```

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:01-08-1989             TIME:20:14:25
KINGSTON/KBE GARAGE - ALTERNATIVE 1 CONDITIONS: PM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=I14ALT1P   GEOMETRICS=KBINT14
KEY:   D
       |
     A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
          FROM D: YIELD
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: KBE GARAGE
EXCLUSIVE LEFT TURN LANES: YES
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D:
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: KINGSTON NB B: KINGSTON SB C: KBE GARAGE  D:
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.50           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: KINGSTON NB B: KINGSTON SB C: KBE GARAGE  D:
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0    0    1  109  849    0  130   86     0    0    0    1
PHF               0.96           0.96           0.96           0.94
ADJ VOLUME        0    0    1  114  884    0  135   90     0    0    0    1
PERCENT GRADE     0.00          -1.00            2.00
PERCENT CYCLES      0.00           0.00           0.00           0.00
PASSENGER CARS      0.00          98.00          %100.00           0.00
PERCENT LT TRU      0.00           0.00           0.00           0.00
PERCENT HV TRU      0.00           2.00           0.00           0.00
PASS CAR/HR       0            110            163  108    0    0    0    1

STEP 1 RIGHT TURNS FROM     C:KBE GARAGE             D:
CONFLICTING FLOWS                        1                 442
CRITICAL GAPS                          5.0                 4.5
CAPACITY                              1199                 870
CAPACITY USED                            0%                  0%
IMPEDANCE FACTOR                      1.00                1.00
ACTUAL CAPACITY                       1199                 870
```

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1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:01-08-1989             TIME:20:14:25
KINGSTON/KBE GARAGE - ALTERNATIVE 1 CONDITIONS: PM PEAK HOUR

STEP 2 LEFT TURNS FROM     B:KINGSTON SB            A:KINGSTON NB
CONFLICTING FLOWS                        1                  884
CRITICAL GAPS                          4.5                  4.5
CAPACITY                              1308                  550
CAPACITY USED                            8%                  0%
IMPEDANCE FACTOR                      0.95                 1.00
ACTUAL CAPACITY                       1308                  550

STEP 3 THRU MOVES FROM     C:KBE GARAGE             D:
CONFLICTING FLOWS                      998                  999
CRITICAL GAPS                          6.0                  5.0
CAPACITY                               274                  397
CAPACITY USED                           39%                  0%
IMPEDANCE FACTOR                      0.68                 1.00
ACTUAL CAPACITY                        261                  378

STEP 4 LEFT TURNS FROM     C:KBE GARAGE             D:
CONFLICTING FLOWS                     1000                 1089
CRITICAL GAPS                          6.0                  5.5
CAPACITY                               274                  291
ACTUAL CAPACITY                        260                  189

                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT               DEMAND    CAPACITY  RESERVE    LOS  AVG DEL(SEC) AVG QUEUE

LT FROM B:               110       1308      1198      A      3.00         0.09

LT FROM C:               163        260        98      E    36.92          1.67
SHARED TH/RT FROM C:     108        261       153      D    23.53          0.70

ALL MOVES FROM D:          1        870       869      A      4.14         0.00
```

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:01-08-1989             TIME:20:18:37
KINGSTON/KBE GARAGE - ALTERNATIVE 1 CONDITIONS: SAT PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=I14ALT1S   GEOMETRICS=KBINT14
KEY:   D
       |
     A-|-B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
          FROM D: YIELD
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: KBE GARAGE
EXCLUSIVE LEFT TURN LANES: YES
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D:
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: KINGSTON NB B: KINGSTON SB C: KBE GARAGE  D:
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.50           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: KINGSTON NB B: KINGSTON SB C: KBE GARAGE  D:
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0    0    1   32   544   0   37   24    0    0    0    1
PHF               0.85           0.85           0.85           0.85
ADJ VOLUME        0    0    1   38   640   0   44   28    0    0    0    1
PERCENT GRADE     0.00          -1.00           2.00
PERCENT CYCLES      0.00           0.00           0.00           0.00
PASSENGER CARS      0.00          98.00          %100.00           0.00
PERCENT LT TRU      0.00           0.00           0.00           0.00
PERCENT HV TRU      0.00           2.00           0.00           0.00
PASS CAR/HR       0             36             52   34    0    0    0    1


STEP 1 RIGHT TURNS FROM     C:KBE GARAGE            D:
CONFLICTING FLOWS                        1                 320
CRITICAL GAPS                          5.0                 4.5
CAPACITY                              1199                 979
CAPACITY USED                            0%                  0%
IMPEDANCE FACTOR                      1.00                1.00
ACTUAL CAPACITY                       1199                 979
```

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1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:01-08-1989            TIME:20:18:37
KINGSTON/KBE GARAGE - ALTERNATIVE 1 CONDITIONS: SAT PEAK HOUR

STEP 2 LEFT TURNS FROM     B:KINGSTON SB             A:KINGSTON NB
CONFLICTING FLOWS                       1                      640
CRITICAL GAPS                         4.5                      4.5
CAPACITY                             1308                      713
CAPACITY USED                           3%                       0%
IMPEDANCE FACTOR                     0.99                     1.00
ACTUAL CAPACITY                      1308                      713


STEP 3 THRU MOVES FROM     C:KBE GARAGE              D:
CONFLICTING FLOWS                     678                      679
CRITICAL GAPS                         6.0                      5.0
CAPACITY                              433                      584
CAPACITY USED                           8%                       0%
IMPEDANCE FACTOR                     0.95                     1.00
ACTUAL CAPACITY                       427                      576


STEP 4 LEFT TURNS FROM     C:KBE GARAGE              D:
CONFLICTING FLOWS                     679                      707
CRITICAL GAPS                         6.0                      5.5
CAPACITY                              432                      483
ACTUAL CAPACITY                       426                      455


                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT               DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUEUE

LT FROM B:               36        1308      1271     A       2.83          0.03

LT FROM C:               52         426       374     B       9.63          0.14
SHARED TH/RT FROM C:     34         427       393     B       9.16          0.09

ALL MOVES FROM D:         1         979       978     A       3.68          0.00
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:01-06-1989             TIME:15:37:41
LINCOLN/KBE GARAGE - ALTERNATIVE 1 CONDITIONS: AM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=I15ALT1A   GEOMETRICS=KBINT15A
KEY:   D
       |
     A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: YIELD
          FROM D: YIELD
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: YES
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: 125 SUMMER
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: KBE GARAGE
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: LINCOLN NB  B: LINCOLN SB  C: 125 SUMMER  D: KBE GARAGE
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: LINCOLN NB  B: LINCOLN SB  C: 125 SUMMER  D: KBE GARAGE
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME          160  722  164    0    0    1    0    0   19    0    0    1
PHF               0.91           0.91           0.91           0.91
ADJ VOLUME      176  793  180    0    0    1    0    0   21    0    0    1
PERCENT GRADE     0.00           0.00           0.00
PERCENT CYCLES      0.00           0.00           0.00           0.00
PASSENGER CARS     98.00           0.00         %100.00            0.00
PERCENT LT TRU      0.00           0.00           0.00           0.00
PERCENT HV TRU      2.00           0.00           0.00           0.00
PASS CAR/HR     179              0              0    0   21    0    0    1

STEP 1 RIGHT TURNS FROM     C:125 SUMMER             D:KBE GARAGE
CONFLICTING FLOWS                      397                   1
CRITICAL GAPS                          4.5                 4.5
CAPACITY                               910                1308
CAPACITY USED                            2%                  0%
IMPEDANCE FACTOR                      0.99                1.00
ACTUAL CAPACITY                        910                1308
```

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1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:01-06-1989             TIME:15:37:41
LINCOLN/KBE GARAGE - ALTERNATIVE 1 CONDITIONS: AM PEAK HOUR

STEP 2 LEFT TURNS FROM     B:LINCOLN SB             A:LINCOLN NB
CONFLICTING FLOWS                      793                   1
CRITICAL GAPS                          4.5                 4.5
CAPACITY                               607                1308
CAPACITY USED                            0%                 14%
IMPEDANCE FACTOR                      1.00                0.91
ACTUAL CAPACITY                        607                1308


STEP 3 THRU MOVES FROM     C:125 SUMMER             D:KBE GARAGE
CONFLICTING FLOWS                      970                 970
CRITICAL GAPS                          5.0                 5.0
CAPACITY                               412                 412
CAPACITY USED                            0%                  0%
IMPEDANCE FACTOR                      1.00                1.00
ACTUAL CAPACITY                        375                 375


STEP 4 LEFT TURNS FROM     C:125 SUMMER             D:KBE GARAGE
CONFLICTING FLOWS                      971                 991
CRITICAL GAPS                          5.5                 5.5
CAPACITY                               342                 333
ACTUAL CAPACITY                        311                 300


                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT               DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUEU

LT FROM A:               179       1308      1128     A      3.19         0.16

ALL MOVES FROM C:         21        910       889     A      4.05         0.02

ALL MOVES FROM D:          1       1308      1307     A      2.75         0.00
```

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:01-06-1989             TIME:15:44:02
LINCOLN/KBE GARAGE - ALTERNATIVE 1 CONDITIONS: PM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=I15ALT1P   GEOMETRICS=KBINT15A
KEY:   D
       |
     A-|-B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
          FROM D: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: YES
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: 125 SUMMER
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: KBE GARAGE
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: LINCOLN NB  B: LINCOLN SB  C: 125 SUMMER  D: KBE GARAGE
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: LINCOLN NB  B: LINCOLN SB  C: 125 SUMMER  D: KBE GARAGE
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0  492   31    0    0    1    0    0  145   27    0    0
PHF               0.91           0.92           0.92           0.92
ADJ VOLUME        0  541   34    0    0    1    0    0  158   29    0    0
PERCENT GRADE     0.00           0.00           0.00
PERCENT CYCLES      0.00           0.00           0.00           0.00
PASSENGER CARS     98.00           0.00          %100.00           0.00
PERCENT LT TRU      0.00           0.00           0.00           0.00
PERCENT HV TRU      2.00           0.00           0.00           0.00
PASS CAR/HR       0              0              0    0  158   32    0    0

STEP 1 RIGHT TURNS FROM     C:125 SUMMER             D:KBE GARAGE
CONFLICTING FLOWS                      270                   1
CRITICAL GAPS                          5.0                 5.0
CAPACITY                               914                1199
CAPACITY USED                           17%                  0%
IMPEDANCE FACTOR                      0.88                1.00
ACTUAL CAPACITY                        914                1199
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1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:01-06-1989            TIME:15:44:02
LINCOLN/KBE GARAGE - ALTERNATIVE 1 CONDITIONS: PM PEAK HOUR

STEP 2 LEFT TURNS FROM      B:LINCOLN SB              A:LINCOLN NB
CONFLICTING FLOWS                      541                         1
CRITICAL GAPS                          4.5                       4.5
CAPACITY                               789                      1308
CAPACITY USED                            0%                        0%
IMPEDANCE FACTOR                      1.00                      1.00
ACTUAL CAPACITY                        789                      1308


STEP 3 THRU MOVES FROM      C:125 SUMMER              D:KBE GARAGE
CONFLICTING FLOWS                      542                       541
CRITICAL GAPS                          5.5                       5.5
CAPACITY                               594                       595
CAPACITY USED                            0%                        0%
IMPEDANCE FACTOR                      1.00                      1.00
ACTUAL CAPACITY                        594                       595


STEP 4 LEFT TURNS FROM      C:125 SUMMER              D:KBE GARAGE
CONFLICTING FLOWS                      542                       699
CRITICAL GAPS                          6.0                       6.0
CAPACITY                               521                       421
ACTUAL CAPACITY                        521                       371


                     SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT                DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUEU


ALL MOVES FROM C:        158        914       756      A      4.76          0.21

ALL MOVES FROM D:         32        371       339      B     10.62          0.10
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:01-06-1989             TIME:15:51:31
LINCOLN/KBE GARAGE - ALTERNATIVE 1 CONDITIONS: SAT PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=I15ALT1S   GEOMETRICS=KBINT15A
KEY:   D
       |
     A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
          FROM D: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: YES
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: 125 SUMMER
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: KBE GARAGE
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: LINCOLN NB  B: LINCOLN SB  C: 125 SUMMER  D: KBE GARAGE
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: LINCOLN NB  B: LINCOLN SB  C: 125 SUMMER  D: KBE GARAGE
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME           41  353   17   0     0    1    0    0   15    0    0    1
PHF               0.95           0.95           0.95           0.95
ADJ VOLUME       43  372   18   0     0    1    0    0   16    0    0    1
PERCENT GRADE     0.00           0.00           0.00
PERCENT CYCLES      0.00           0.00           0.00           0.00
PASSENGER CARS     98.00           0.00          %100.00           0.00
PERCENT LT TRU      0.00           0.00           0.00           0.00
PERCENT HV TRU      2.00           0.00           0.00           0.00
PASS CAR/HR      44              0              0    0   16    0    0    1

STEP 1 RIGHT TURNS FROM     C:125 SUMMER             D:KBE GARAGE
CONFLICTING FLOWS                      186                    1
CRITICAL GAPS                          5.0                  5.0
CAPACITY                               997                 1199
CAPACITY USED                            2%                   0%
IMPEDANCE FACTOR                      0.99                 1.00
ACTUAL CAPACITY                        997                 1199
```

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1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:01-06-1989              TIME:15:51:31
LINCOLN/KBE GARAGE - ALTERNATIVE 1 CONDITIONS: SAT PEAK HOUR

STEP 2 LEFT TURNS FROM     B:LINCOLN SB                A:LINCOLN NB
CONFLICTING FLOWS                     372                         1
CRITICAL GAPS                         4.5                       4.5
CAPACITY                              932                      1308
CAPACITY USED                          0%                        3%
IMPEDANCE FACTOR                     1.00                      0.98
ACTUAL CAPACITY                       932                      1308


STEP 3 THRU MOVES FROM     C:125 SUMMER                D:KBE GARAGE
CONFLICTING FLOWS                     416                       415
CRITICAL GAPS                         5.5                       5.5
CAPACITY                              692                       692
CAPACITY USED                          0%                        0%
IMPEDANCE FACTOR                     1.00                      1.00
ACTUAL CAPACITY                       680                       681


STEP 4 LEFT TURNS FROM     C:125 SUMMER                D:KBE GARAGE
CONFLICTING FLOWS                     417                       431
CRITICAL GAPS                         6.0                       6.0
CAPACITY                              614                       602
ACTUAL CAPACITY                       603                       589


                      SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT                 DEMAND   CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUEU

LT FROM A:                 44       1308      1264     A       2.85          0.03

ALL MOVES FROM C:          16        997       981     A       3.67          0.02

ALL MOVES FROM D:           1       1199      1198     A       3.00          0.00
```

LEVEL OF SERVICE CALCULATIONS:

TWO-WAY ESSEX STREET -
NO BUILD (1993) CONDITIONS
(AM and PM peak hours)

- Summer/Lincoln/Bedford
- Bedford/Chauncy/LP Garage
- Surface Artery/Essex/Lincoln
- Essex/Kingston/Ave. DeLafayette
- Essex/Washington
- Chauncy/Ave. DeLafayette

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
SUMMER/LINCOLN/BEDFORD
NO BUILD CONDITIONS - 2-WAY ESSEX: AM PEAK HOUR
date:01-06-1989             time:14:33:53
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2NBEA     GEOMETRICS=KBINT2     SIGNAL=KBINT2
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT     WALK
EB    0  105    3     0  1  1     0.0 10.0  9.0    36
WB  137  273    0     1  1  0    13.0 13.0  0.0    33
NB  194  350  125     1  1  1    10.0 10.0 10.0    27
SB    0    0    0     0  0  0     0.0  0.0  0.0     0

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0    0   .910  450   N    14.0    3
WB  0.0%  2.0%   N     0   21   .910 1000   N    14.0    3
NB  0.0%  2.0%   N     0    0   .910  850   N    11.8    3
SB  0.0%  0.0%         0    0   .000    0        11.8    0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1           *           *  *  *  *                 31.6   2    A
 2     *  *        *                 *           *  10.0   2    A
 3              *  *                             *  12.4   2    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0  105    3  .910     0  115    3
WB   137  273    0  .910   151  300    0
NB   194  350  125  .910   213  385  137
SB     0    0    0  .000     0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU     v  Plt  Prt
EB  TH           115 1 1.00  115 0.00 0.00
EB  RT             3 1 1.00    3 0.00 1.00
WB  LT           151 1 1.00  151 1.00 0.00
WB  TH           300 1 1.00  300 0.00 0.00
NB  LT           213 1 1.00  213 1.00 0.00
NB  TH           385 1 1.00  385 0.00 0.00
NB  RT           137 1 1.00  137 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT    VOLUME
WESTBOUND         0  115    3         0    0    0        0   1   1       0
NORTHBOUND        0    0    0         0    0    0        0   0   0       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  TH          1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
EB  RT          1800  1 0.900 0.990 1.000 1.000 1.000 0.900 0.445 1.000  643
WB  LT          1800  1 1.033 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1575
WB  TH          1800  1 1.033 0.990 1.000 1.000 0.913 0.900 1.000 1.000 1512
NB  LT          1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1422
NB  TH          1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
NB  RT        1800  1 0.933 0.990 1.000 1.000 1.000 0.900 0.374 1.000  560

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  TH        115 1497 0.08 0.17   249 0.46
EB  RT          3  643 0.01 0.17   107 0.03
WB  LT        151 1575 0.10 0.21   325 0.46
WB  TH        300 1512 0.20 0.41   615 0.49     *
NB  LT        213 1422 0.15 0.53   749 0.28
NB  TH        385 1497 0.26 0.53   788 0.49     *
NB  RT        137  560 0.25 0.53   295 0.47

CYCLE= 60.0  LOST= 4.0  SUM V/S CRIT= 0.46 TOTAL V/C= 0.49

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH       0.46 0.17  60.0  17.16  249    1.00 0.85   15.43  C   1.6     2
EB  RT       0.03 0.17  60.0  15.92  107    0.00 0.85   13.53  B   0.0     1
WB  LT       0.46 0.21  60.0  15.87  325    0.77 1.00   16.63  C   2.0     3
WB  TH       0.49 0.41  60.0  10.01  615    0.50 0.85    8.94  B   3.0     3
NB  LT       0.28 0.53  60.0   6.01  749    0.06 1.00    6.07  B   1.7     2
NB  TH       0.49 0.53  60.0   6.87  788    0.39 0.85    6.18  B   3.0     3
NB  RT       0.47 0.53  60.0   6.77  295    0.87 0.85    6.49  B   1.1     1

DIR Delay LOS
EB  15.38  C
WB  11.51  B
NB   6.20  B
INTERSECTION DELAY =  8.87 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE   7.7 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
SUMMER/LINCOLN/BEDFORD
NO BUILD CONDITIONS - 2-WAY ESSEX: PM PEAK HOUR
date:01-06-1989              time:14:36:11
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2NBEP     GEOMETRICS=KBINT2     SIGNAL=KBINT2
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES       # OF LANES     LANE WIDTH      CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT      WALK
EB    0  200    5     0  1  1     0.0 10.0  9.0      36
WB  156  195    0     1  1  0    13.0 13.0  0.0      33
NB   40  238  259     1  1  1    10.0 10.0 10.0      27
SB    0    0    0     0  0  0     0.0  0.0  0.0       0

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                 PEDESTRIANS        ARR
DIR GRADE %HV    Y/N MOVES BUSES   PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%    N      0     0  .920  450   N     14.0    3
WB  0.0%  2.0%    N      0    21  .920 1000   N     14.0    3
NB  0.0%  2.0%    N      0     0  .920  850   N     11.8    3
SB  0.0%  0.0%           0     0  .920    0         11.8    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1           *           *  *  *  *                 35.9   2     A
 2     *  *        *                 *           *  10.4   2     A
 3              *  *                             *   7.7   2     A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET .
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0  200    5  .920     0  217    5
WB   156  195    0  .920   170  212    0
NB    40  238  259  .920    43  259  282
SB     0    0    0  .920     0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
EB  TH         217 1 1.00  217 0.00 0.00
EB  RT           5 1 1.00    5 0.00 1.00
WB  LT         170 1 1.00  170 1.00 0.00
WB  TH         212 1 1.00  212 0.00 0.00
NB  LT          43 1 1.00   43 1.00 0.00
NB  TH         259 1 1.00  259 0.00 0.00
NB  RT         282 1 1.00  282 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                  OPPOSING APPROACH
BEING OPPOSED       VOLUMES        % OPPOSING LEFT TURN      # LANES      OPPOSING
                  LT   TH   RT        LT   TH   RT         LT  TH  RT      VOLUME
WESTBOUND          0  217    5         0    0    0          0   1   1           0
NORTHBOUND         0    0    0         0    0    0          0   0   0           0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  TH         1800 1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
EB  RT         1800 1 0.900 0.990 1.000 1.000 1.000 0.900 0.445 1.000  643
WB  LT         1800 1 1.033 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1575
WB  TH         1800 1 1.033 0.990 1.000 1.000 0.913 0.900 1.000 1.000 1512
NB  LT         1800 1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1422
NB  TH         1800 1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
NB  RT        1800  1 0.933 0.990 1.000 1.000 1.000 0.900 0.374 1.000  560

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  TH        217 1497 0.15 0.17  259 0.84     *
EB  RT          5  643 0.01 0.17  111 0.05
WB  LT        170 1575 0.11 0.13  202 0.84     *
WB  TH        212 1512 0.14 0.33  506 0.42
NB  LT         43 1422 0.03 0.60  852 0.05
NB  TH        259 1497 0.17 0.60  897 0.29
NB  RT        282  560 0.50 0.60  335 0.84     *

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.76 TOTAL V/C= 0.84

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH       0.84 0.17  60.0  18.25  259    14.46 0.85   27.80 D    3.2    6
EB  RT       0.05 0.17  60.0  15.73  111     0.00 0.85   13.37 B    0.1    1
WB  LT       0.84 0.13  60.0  19.42  202    17.53 1.00   36.95 D    3.0    6
WB  TH       0.42 0.33  60.0  11.75  506     0.34 0.85   10.28 B    2.4    3
NB  LT       0.05 0.60  60.0   3.78  852     0.00 1.00    3.78 A    0.3    1
NB  TH       0.29 0.60  60.0   4.43  897     0.05 0.85    3.81 A    1.7    2
NB  RT       0.84 0.60  60.0   7.38  335    11.76 0.85   16.27 C    2.2    5

DIR Delay LOS
EB  27.45  D
WB  22.13  C
NB   9.82  B
INTERSECTION DELAY = 17.08 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  29.4 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
BEDFORD/CHAUNCY/LP GARAGE
NO BUILD CONDITIONS - 2-WAY ESSEX: AM PEAK HOUR
date:01-06-1989             time:14:47:00
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I6NBEA     GEOMETRICS=KBINT6     SIGNAL=KBINT6
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT    TH    RT    LT TH RT     LT    TH    RT     WALK
EB    12    45    13    0  1  0    0.0 14.0  0.0     20
WB    78    98    57    0  1  0    0.0 14.0  0.0     32
NB   108   142    68    0  1  0    0.0 14.0  0.0     32
SB     0     0     0    0  0  0    0.0  0.0  0.0      0

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                 PEDESTRIANS         ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%   N      0     0   .920  100    N     11.0    3
WB  0.0%  2.0%   N      0     0   .920  300    N     11.0    3
NB  0.0%  2.0%   N      0     0   .920  100    N     11.0    3
SB  0.0%  0.0%          0     0   .000  100    N     11.0    0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *     *  *  *                 *           *  19.6   4    A
 2           *           *  *  *  *                    32.4   4    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR   LTV   THV   RTV    PHF   LTFR THFR RTFR
EB     12    45    13  .920     13   49   14
WB     78    98    57  .920     85  107   62
NB    108   142    68  .920    117  154   74
SB      0     0     0  .000      0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU     v  Plt  Prt
EB  LT-TH-RT    76 1 1.00    76 0.17 0.19
WB  LT-TH-RT   253 1 1.00   253 0.33 0.24
NB  LT-TH-RT   346 1 1.00   346 0.34 0.21

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN      # LANES     OPPOSING
                 LT   TH    RT         LT   TH   RT         LT  TH  RT      VOLUME
EASTBOUND        85  107    62        100  100  100          0   1   0       168
WESTBOUND        13   49    14        100  100  100          0   1   0        63
NORTHBOUND        0    0     0          0    0    0          0   0   0         0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid    Fhv    Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  LT-TH-RT  1800  1 1.067 1.000 1.000 1.000 1.000 0.900 0.866 1.000 1497
WB  LT-TH-RT  1800  1 1.067 0.990 1.000 1.000 1.000 0.900 0.855 1.000 1463
NB  LT-TH-RT  1800  1 1.067 0.990 1.000 1.000 1.000 0.900 0.841 0.838 1205

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C    G  N    Va    Vm   Vlt  Plt No    Vo Plto
EB  60   20  1    76    63    13 0.17  1   168 0.33
WB  60   20  1   253   168    85 0.33  1    63 0.17
CALCULATIONS
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DIR Sop    Yo      Gu     Fs     Pl      Gq     Pt     Gf         El     Fm    Flt
EB 1613 0.104 14.853 0.770 0.171  4.716 0.829  3.462     1.462 1.000 1.000
WB 1668 0.038 17.981 0.836 0.335  1.588 0.665  1.099     1.346 1.000 1.000

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v     s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH-RT    76 1497 0.05 0.33  488 0.16
WB  LT-TH-RT   253 1463 0.17 0.33  477 0.53      *
NB  LT-TH-RT   346 1205 0.29 0.54  651 0.53      *

CYCLE= 60.0  LOST= 8.0  SUM V/S CRIT= 0.46 TOTAL V/C= 0.53

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C      d1    c       d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.16 0.33  60.0  10.91  488     0.01 0.85    9.28  B   0.9     1
WB  LT-TH-RT 0.53 0.33  60.0  12.52  477     0.91 0.85   11.41  B   2.8     3
NB  LT-TH-RT 0.53 0.54  60.0   6.75  651     0.67 0.85    6.30  B   2.6     3

DIR Delay LOS
EB   9.28  B
WB  11.41  B
NB   6.30  B
INTERSECTION DELAY =  8.56 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  15.5 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
BEDFORD/CHAUNCY/LP GARAGE
NO BUILD CONDITIONS - 2-WAY ESSEX: PM PEAK HOUR
date:01-06-1989             time:14:49:17
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I6NBEP      GEOMETRICS=KBINT6      SIGNAL=KBINT6
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH      CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT     WALK
EB   74  286  108     0  1  0     0.0 14.0  0.0     20
WB  144   56   54     0  1  0     0.0 14.0  0.0     32
NB   62  168   53     0  1  0     0.0 14.0  0.0     32
SB    0    0    0     0  0  0     0.0  0.0  0.0      0

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                 PEDESTRIANS       ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%   N      0     0  .920  100   N     11.0    3
WB  0.0%  2.0%   N      0     0  .920  300   N     11.0    3
NB  0.0%  2.0%   N      0     0  .920  100   N     11.0    3
SB  0.0%  0.0%          0     0  .000  100   N     11.0    0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *     *  *  *              *           *  30.3   4    A
 2           *           *  *  *  *                 21.7   4    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR   LTV   THV   RTV    PHF   LTFR THFR RTFR
EB     74   286   108  .920    80   311  117
WB    144    56    54  .920   157    61   59
NB     62   168    53  .920    67   183   58
SB      0     0     0  .000     0     0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N    LU     v   Plt   Prt
EB  LT-TH-RT    509 1 1.00    509 0.16 0.23
WB  LT-TH-RT    276 1 1.00    276 0.57 0.21
NB  LT-TH-RT    308 1 1.00    308 0.22 0.19

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                  OPPOSING APPROACH
BEING OPPOSED          VOLUMES       % OPPOSING LEFT TURN     # LANES      OPPOSING
                   LT    TH    RT        LT    TH    RT      LT  TH  RT      VOLUME
EASTBOUND         157    61    59       100   100   100       0   1   0        120
WESTBOUND          80   311   117       100   100   100       0   1   0        428
NORTHBOUND          0     0     0         0     0     0       0   0   0          0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv    Fgr  Fpark  Fbus  Farea   Frt   Flt     s
EB  LT-TH-RT  1800  1 1.067 1.000 1.000 1.000 1.000 0.900 0.858 1.000 1482
WB  LT-TH-RT  1800  1 1.067 0.990 1.000 1.000 1.000 0.900 0.861 0.603  888
NB  LT-TH-RT  1800  1 1.067 0.990 1.000 1.000 1.000 0.900 0.848 0.860 1248

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N    Va   Vm   Vlt  Plt No   Vo Plto
EB  60  30  1   509  428   80 0.16  1  120 0.57
WB  60  30  1   276  120  157 0.57  1  428 0.16
CALCULATIONS
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DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
EB 1214 0.099 27.009 0.800 0.158  3.250 0.842  2.598    1.406 1.000 1.000
WB 1691 0.253 20.177 0.607 0.567 10.083 0.433  1.505    1.852 0.603 0.603

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH-RT  509 1482 0.34 0.50  748 0.68     *
WB  LT-TH-RT  276  888 0.31 0.50  448 0.62
NB  LT-TH-RT  308 1248 0.25 0.36  452 0.68     *

CYCLE= 60.0  LOST= 8.0  SUM V/S CRIT= 0.59 TOTAL V/C= 0.68

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.68 0.50  60.0   8.53  748    1.76 0.85    8.75  B   4.2    5
WB  LT-TH-RT 0.62 0.50  60.0   8.13  448    1.82 0.85    8.46  B   2.3    3
NB  LT-TH-RT 0.68 0.36  60.0  12.30  452    2.86 0.85   12.89  B   3.3    4

DIR Delay LOS
EB   8.75  B
WB   8.46  B
NB  12.89  B
INTERSECTION DELAY =  9.84 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  21.1 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/SURFACE ARTERY/LINCOLN STREETS
NO BUILD - 2-WAY ESSEX - AM PEAK HOUR
date:01-11-1989                time:23:02:20
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I7NBEA      GEOMETRICS=KBINT7E     SIGNAL=I7NBEA
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES        # OF LANES       LANE WIDTH       CROSS
DIR  LT    TH    RT     LT  TH  RT      LT    TH    RT     WALK
EB  159   587   155     0   3   1      0.0 10.0 15.0      70
WB   25   223     0     0   2   0      0.0 12.0  0.0      70
NB   54  1163    21     0   3   0      0.0 11.0  0.0      56
SB  160   708   247     0   3   0      0.0 11.0  0.0      66

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                  PEDESTRIANS        ARR
DIR GRADE %HV    Y/N MOVES BUSES   PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%    N     0     0   .870   30   Y    20.5     3
WB  0.0%  2.0%    N    10     0   .870  200   Y    20.5     3
NB  0.0%  2.0%    N     0     0   .870  200   Y    19.5     3
SB  0.0%  2.0%    N     0     0   .870  380   Y    19.5     3

PHASINGS
    EASTBOUND    WESTBOUND    NORTHBOUND   SOUTHBOUND GREEN   Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *                          *              *  30.8    4    A
 2              *  *  *                                12.7    4    A
 3           *           *              *  *  *        44.5    4    A
 4        *                 *  *  *                    46.0    4    A

CYCLE= 150.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR   LTV   THV   RTV    PHF   LTFR  THFR  RTFR
EB    159   587   155   .870    183   675   178
WB     25   223     0   .870     29   256     0
NB     54  1163    21   .870     62  1337    24
SB    160   708   247   .870    184   814   284

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N   LU     v  Plt  Prt
EB  LT-TH       857 3 1.10   943 0.21 0.00
EB  RT          178 1 1.00   178 0.00 1.00
WB  LT-TH       285 2 1.05   299 0.10 0.00
NB  LT-TH-RT   1423 3 1.10  1565 0.04 0.02
SB  LT-TH-RT   1282 3 1.10  1410 0.14 0.22

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                 OPPOSING APPROACH
BEING OPPOSED          VOLUMES        % OPPOSING LEFT TURN      # LANES      OPPOSIN
                    LT    TH    RT        LT     TH     RT        LT   TH   RT     VOLUME
EASTBOUND           29   256     0         0      0      0         0    2    0          0
WESTBOUND          183   675   178         0      0      0         0    3    1          0
NORTHBOUND         184   814   284         0      0      0         0    3    0          0
SOUTHBOUND          62  1337    24         0      0      0         0    3    0          0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP   IDEAL N  Fwid    Fhv    Fgr  Fpark  Fbus  Farea   Frt    Flt     s
EB  LT-TH      1800   3 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.929 4174
EB  RT         1800   1 1.100 0.990 1.000 1.000 1.000 0.900 0.812 1.000 1432
WB  LT-TH      1800   2 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3208
NB  LT-TH-RT   1800   3 0.967 0.990 1.000 1.000 1.000 0.900 0.997 1.000 4640
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SB  LT-TH-RT  1800   3 0.967 0.990 1.000 1.000 1.000 0.900 0.964 0.965 4324

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v     s  v/s  g/C     c  v/c  CRITICAL
EB  LT-TH      943 4174 0.23 0.21   858 1.10     *
EB  RT         178 1432 0.12 0.54   772 0.23
WB  LT-TH      299 3208 0.09 0.08   272 1.10     *
NB  LT-TH-RT 1565 4640 0.34 0.31 1423 1.10     *
SB  LT-TH-RT 1410 4324 0.33 0.30 1282 1.10     *

CYCLE=150.0  LOST=16.0  SUM V/S CRIT= 0.98 TOTAL V/C= 1.10

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C      d1     c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH     1.10 0.21 150.0  46.49  858    57.49 0.85   88.38  F  35.2   64
EB  RT        0.23 0.54 150.0  13.85  772     0.03 0.85   11.79  B   3.4    3
WB  LT-TH     1.10 0.08 150.0  52.65  272    78.12 0.85  111.16  F  14.2   27
NB  LT-TH-RT 1.10 0.31 150.0  41.35 1423    52.22 0.85   79.53  F  52.0   95
SB  LT-TH-RT 1.10 0.30 150.0  41.87 1282    53.16 0.85   80.78  F  47.5   87

DIR Delay LOS
EB  76.22  F
WB 111.16  F
NB  79.53  F
SB  80.78  F
INTERSECTION DELAY = 81.24 INTERSECTION LOS=F

THE CYCLE LENGTH WITHIN THE BOUNDS OF  90  TO  150 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 150.0 SECONDS

THE V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/SURFACE ARTERY/LINCOLN STREETS
NO BUILD - 2-WAY ESSEX - PM PEAK HOUR
date:01-11-1989             time:22:25:10
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I7NBEP     GEOMETRICS=KBINT7E    SIGNAL=I7NBEP
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES       # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT     LT   TH   RT     WALK
EB  148  811  628     0  3  1     0.0 10.0 15.0     70
WB   25  126   10     0  2  0     0.0 12.0  0.0     70
NB   37  578   13     0  3  0     0.0 11.0  0.0     56
SB  114 1252  184     0  3  0     0.0 11.0  0.0     66

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK               PEDESTRIANS         ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0     0   .940   15   Y     20.5    3
WB  0.0%  2.0%   N    10     0   .940  180   Y     20.5    3
NB  0.0%  2.0%   N     0     0   .940  100   Y     19.5    3
SB  0.0%  2.0%   N     0     0   .940  310   Y     19.5    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *                          *           *  34.3    4    A
 2              *  *  *                              7.2    4    A
 3           *           *              *  *  *     51.7    4    A
 4        *                 *  *  *                 20.7    4    A

CYCLE= 130.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR   LTV  THV  RTV   PHF  LTFR THFR RTFR
EB    148  811  628  .940   157  863  668
WB     25  126   10  .940    27  134   11
NB     37  578   13  .940    39  615   14
SB    114 1252  184  .940   121 1332  196

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
EB  LT-TH     1020 3 1.10 1122 0.15 0.00
EB  RT         668 1 1.00  668 0.00 1.00
WB  LT-TH-RT   171 2 1.05  180 0.16 0.06
NB  LT-TH-RT   668 3 1.10  735 0.06 0.02
SB  LT-TH-RT  1649 3 1.10 1814 0.07 0.12

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                  OPPOSING APPROACH
BEING OPPOSED        VOLUMES       % OPPOSING LEFT TURN      # LANES       OPPOSING
                   LT   TH    RT        LT    TH    RT        LT  TH  RT      VOLUME
EASTBOUND          27  134    11         0     0     0         0   2   0           0
WESTBOUND         157  863   668         0     0     0         0   3   1           0
NORTHBOUND        121 1332   196         0     0     0         0   3   0           0
SOUTHBOUND         39  615    14         0     0     0         0   3   0           0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr  Fpark  Fbus  Farea   Frt   Flt     s
EB  LT-TH     1800  3 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.954 4285
EB  RT        1800  1 1.100 0.990 1.000 1.000 1.000 0.900 0.820 1.000 1447
WB  LT-TH-RT  1800  2 1.000 0.990 1.000 1.000 1.000 0.900 0.991 1.000 3178
NB  LT-TH-RT  1800  3 0.967 0.990 1.000 1.000 1.000 0.900 0.997 1.000 4637
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SB  LT-TH-RT  1800  3 0.967 0.990 1.000 1.000 1.000 0.900 0.981 0.983 4486

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s v/s   g/C    c  v/c  CRITICAL
EB  LT-TH     1122 4285 0.26 0.26 1130 0.99
EB  RT         668 1447 0.46 0.45  657 1.02     *
WB  LT-TH-RT   180 3178 0.06 0.06  177 1.02     *
NB  LT-TH-RT   735 4637 0.16 0.16  740 0.99
SB  LT-TH-RT  1814 4486 0.40 0.40 1785 1.02     *

CYCLE=130.0  LOST=12.0  SUM V/S CRIT= 0.92 TOTAL V/C= 1.02

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C      d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH     0.99 0.26 130.0  36.28 1130   19.10 0.85   47.07  E  27.1   41
EB  RT        1.02 0.45 130.0  27.35  657   31.24 0.85   49.80  E  15.8   29
WB  LT-TH-RT  1.02 0.06 130.0  46.69  177   57.11 0.85   88.23  F   7.1   14
NB  LT-TH-RT  0.99 0.16 130.0  41.46  740   23.86 0.85   55.52  E  20.4   32
SB  LT-TH-RT  1.02 0.40 130.0  30.06 1785   20.18 0.85   42.71  E  37.5   60

DIR Delay LOS
EB  48.09  E
WB  88.23  F
NB  55.52  E
SB  42.71  E
INTERSECTION DELAY = 48.74 INTERSECTION LOS=E

THE CYCLE LENGTH WITHIN THE BOUNDS OF  90  TO  150 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 130.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 415.3 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
KINGSTON/ESSEX/AVE DE LAFAYETTE
NO BUILD CONDITIONS- 2-WAY ESSEX: PM PEAK HOUR
date:01-06-1989             time:09:48:53
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I9NBEP     GEOMETRICS=KBINT9E    SIGNAL=KBINT9E
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES       # OF LANES      LANE WIDTH     CROSS
DIR  LT   TH    RT    LT TH RT      LT    TH    RT     WALK
EB    0 1082   135     0  2  1     0.0  11.0  10.0     35
WB    0  467     0     0  2  0     0.0  11.0   0.0     35
NB    0    0     0     0  0  0     0.0   0.0   0.0     33
SB  515  364    50     1  1  1    12.0  12.0  10.0     35

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK               PEDESTRIANS      ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%   N     0     0  .960  100   Y     12.8    3
WB  0.0%  2.0%   N     0     0  .960  100   Y     12.8    3
NB  0.0%  0.0%   N     0     0  .000  100   Y     12.8    0
SB  0.0%  0.0%   N     0     0  .960  100   Y     12.8    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1     *  *        *                 *           *  28.1   3    A
 2           *           *              *  *  *     25.9   3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0 1082  135  .960     0 1127  141
WB     0  467    0  .960     0  486    0
NB     0    0    0  .000     0    0    0
SB   515  364   50  .960   536  379   52

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N   LU    v  Plt  Prt
EB  TH         1127 2 1.05 1183 0.00 0.00
EB  RT          141 1 1.00  141 0.00 1.00
WB  TH          486 2 1.05  511 0.00 0.00
SB  LT          536 1 1.00  536 1.00 0.00
SB  TH          379 1 1.00  379 0.00 0.00
SB  RT           52 1 1.00   52 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN     # LANES     OPPOSING
                 LT   TH   RT       LT   TH   RT        LT  TH  RT     VOLUME
SOUTHBOUND        0    0    0        0    0    0         0   0   0        0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP   IDEAL N  Fwid   Fhv   Fgr  Fpark  Fbus Farea   Frt   Flt    s
EB  TH          1800 2 0.967 1.000 1.000 1.000 1.000 0.900 1.000 1.000 3132
EB  RT          1800 1 0.933 1.000 1.000 1.000 1.000 0.900 0.802 1.000 1213
WB  TH          1800 2 0.967 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3101
SB  LT          1800 1 1.000 1.000 1.000 1.000 1.000 0.900 1.000 0.950 1539
SB  TH          1800 1 1.000 1.000 1.000 1.000 1.000 0.900 1.000 1.000 1620
SB  RT          1800 1 0.933 1.000 1.000 1.000 1.000 0.900 0.802 1.000 1213

CAPACITY ANALYSIS WORKSHEET
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DIR LN GROUP    v    s v/s  g/C    c v/c  CRITICAL
EB  TH       1183 3132 0.38 0.47 1466 0.81     *
EB  RT        141 1213 0.12 0.47  568 0.25
WB  TH        511 3101 0.16 0.47 1452 0.35
SB  LT        536 1539 0.35 0.43  665 0.81     *
SB  TH        379 1620 0.23 0.43  700 0.54
SB  RT         52 1213 0.04 0.43  524 0.10

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.73 TOTAL V/C= 0.81

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH       0.81 0.47  60.0  10.37 1466    2.44 0.85   10.88  B 10.0   11
EB  RT       0.25 0.47  60.0   7.30  568    0.05 0.85    6.24  B  1.2    1
WB  TH       0.35 0.47  60.0   7.72 1452    0.06 0.85    6.62  B  4.3    4
SB  LT       0.81 0.43  60.0  11.30  665    5.08 1.00   16.38  C  5.1    8
SB  TH       0.54 0.43  60.0   9.61  700    0.68 0.85    8.74  B  3.6    4
SB  RT       0.10 0.43  60.0   7.69  524    0.00 0.85    6.54  B  0.5    1

DIR Delay LOS
EB  10.39  B
WB   6.62  B
SB  12.86  B
INTERSECTION DELAY = 10.55 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  25.5 SECONDS
THE EXISTING TIMING IS OPTIMAL
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PERATIONAL ANALYSIS
ESSEX/WASHINGTON
NO BUILD CONDITIONS - 2-WAY ESSEX: AM PEAK HOUR
date:01-06-1989             time:14:12:49
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I11NBEA    GEOMETRICS=KBINT11    SIGNAL=KBINT11
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB  165   770    0    1  2  0    11.0 11.0  0.0    28
WB    0     0    0    0  0  0     0.0  0.0  0.0    31
NB    0  371  437     0  2  1     0.0 11.0 11.0    36
SB    0     0    0    0  0  0     0.0  0.0  0.0    36

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0    0  .930  200   Y     11.8    3
WB  0.0%  0.0%         0    0  .000  200         11.8    0
NB  0.0%  2.0%   N     0    0  .930  550   Y     13.0    3
SB  0.0%  0.0%         0    0  .000  750   Y     13.0    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN   Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *                             *           *  22.2    3    A
 2           *           *     *  *                 31.8    3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB   165  770    0  .930   177  828    0
WB     0    0    0  .000     0    0    0
NB     0  371  437  .930     0  399  470
SB     0    0    0  .000     0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU      v  Plt  Prt
EB  LT         177 1 1.00   177 1.00 0.00
EB  TH         828 2 1.05   869 0.00 0.00
NB  TH         399 2 1.05   419 0.00 0.00
NB  RT         470 1 1.00   470 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES      OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT     VOLUME
EASTBOUND         0    0    0         0    0    0         0   0   0        0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  LT        1800  1 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1473
EB  TH        1800  2 0.967 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3101
NB  TH        1800  2 0.967 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3101
NB  RT        1800  1 0.967 0.990 1.000 1.000 1.000 0.900 0.755 1.000 1170

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C     c  v/c  CRITICAL
EB  LT        177 1473 0.12 0.37  545 0.33
EB  TH        869 3101 0.28 0.37 1147 0.76      *
NB  TH        419 3101 0.14 0.53 1643 0.25
NB  RT        470 1170 0.40 0.53  620 0.76      *

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.68 TOTAL V/C= 0.76
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LEVEL OF SERVICE WORKSHEET
DIR LN GROUP v/c   g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT       0.33 0.37  60.0  10.29  545    0.13 1.00   10.42  B   1.9    2
EB  TH       0.76 0.37  60.0  12.57 1147    2.07 0.85   12.45  B   8.7   10
NB  TH       0.25 0.53  60.0   5.82 1643    0.02 0.85    4.97  A   3.1    3
NB  RT       0.76 0.53  60.0   8.42  620    3.72 0.85   10.31  B   3.7    5

DIR Delay LOS
EB  12.11  B
NB   7.79  B
INTERSECTION DELAY = 10.13 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  21.3 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/WASHINGTON
NO BUILD CONDITIONS - 2-WAY ESSEX: PM PEAK HOUR
date:01-11-1989             time:08:20:23
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I11NBEP    GEOMETRICS=KBINT11M   SIGNAL=KBINT11
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES         # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB  124  943    0     0  3  0     0.0 11.0  0.0    28
WB    0    0    0     0  0  0     0.0  0.0  0.0    31
NB    0  151  656     0  2  1     0.0 11.0 11.0    36
SB    0    0    0     0  0  0     0.0  0.0  0.0    36

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS       ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0    0   .910  200   Y    11.8    3
WB  0.0%  0.0%         0    0   .000  200        11.8    0
NB  0.0%  2.0%   N     0    0   .910  590   Y    13.0    3
SB  0.0%  0.0%         0    0   .000  750   Y    13.0    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *                             *           *  27.2   3    A
 2           *           *     *  *                 56.8   3    A

CYCLE=  90.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB   124  943    0  .910   136 1036    0
WB     0    0    0  .000     0    0    0
NB     0  151  656  .910     0  166  721
SB     0    0    0  .000     0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
EB  LT-TH     1173 3 1.10 1290 0.12 0.00
NB  TH         166 2 1.05  174 0.00 0.00
NB  RT         721 1 1.00  721 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT    VOLUME
EASTBOUND         0    0    0         0    0    0        0   0   0       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt     s
EB  LT-TH     1800  3 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.941 4377
NB  TH        1800  2 0.967 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3101
NB  RT        1800  1 0.967 0.990 1.000 1.000 1.000 0.900 0.755 1.000 1170

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH     1290 4377 0.29 0.30 1322 0.98     *
NB  TH         174 3101 0.06 0.63 1958 0.09
NB  RT         721 1170 0.62 0.63  739 0.98     *

CYCLE= 90.0  LOST= 6.0  SUM V/S CRIT= 0.91 TOTAL V/C= 0.98
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LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c g/C    C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH    0.98 0.30  90.0  23.62 1322   14.34 0.85   32.27  D  20.7   32
NB  TH       0.09 0.63  90.0   4.92 1958    0.00 0.85    4.19  A   1.5    2
NB  RT       0.98 0.63  90.0  12.10  739   20.27 0.85   27.52  D   8.8   17

DIR Delay LOS
EB  32.27  D
NB  22.98  C
INTERSECTION DELAY = 28.46 INTERSECTION LOS=D

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  90.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 144.9 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
CHAUNCY/AVE DE LAFAYETTE
NO BUILD CONDITIONS - 2-WAY ESSEX: AM PEAK HOUR
date:01-06-1989             time:14:24:27
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I13NBEA    GEOMETRICS=KBINT13    SIGNAL=KBINT13
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB    0    0    0     0  0  0     0.0  0.0  0.0     0
WB    0  654   48     0  2  0     0.0 11.0  0.0    44
NB   87  260    0     1  1  0    11.0 10.0  0.0    40
SB    0    0   91     0  0  1     0.0  0.0 14.0    36

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS         ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%         0    0   .000  100        15.0    0
WB  0.0%  2.0%   Y     0    0   .940  100   N    15.0    3
NB  0.0%  2.0%   Y     0    0   .940  100   N    14.0    3
SB  0.0%  2.0%   N     0    0   .940  100   N    14.0    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1                 *  *              *           *  31.4   3    A
 2           *           *  *  *              *     22.6   3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV    PHF  LTFR THFR RTFR
EB     0    0    0  .000   136 1036    0
WB     0  654   48  .940     0  696   51
NB    87  260    0  .940    93  277    0
SB     0    0   91  .940     0    0   97

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
WB  TH-RT      747 2 1.05  784 0.00 0.07
NB  LT          93 1 1.00   93 1.00 0.00
NB  TH         277 1 1.00  277 0.00 0.00
SB  RT          97 1 1.00   97 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT    VOLUME
NORTHBOUND        0    0   97       100    0    0        0   0   1       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
WB  TH-RT     1800  2 0.967 0.990 1.000 1.000 1.000 0.900 0.986 1.000 3059
NB  LT        1800  1 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1473
NB  TH        1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
SB  RT        1800  1 1.067 0.990 1.000 1.000 1.000 0.900 0.802 1.000 1373

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
WB  TH-RT     784 3059 0.26 0.52 1600 0.49      *
NB  LT         93 1473 0.06 0.38  555 0.17
NB  TH        277 1497 0.18 0.38  564 0.49      *
SB  RT         97 1373 0.07 0.38  518 0.19
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CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.44 TOTAL V/C= 0.49

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C      d1    c       d2   PF    Delay LOS Avg Q  95% Q
WB  TH-RT     0.49 0.52  60.0   6.98 1600    0.20 0.85    6.10  B    5.9      6
NB  LT        0.17 0.38  60.0   9.44  555    0.01 1.00    9.46  B    1.0      1
NB  TH        0.49 0.38  60.0  10.86  564    0.56 0.85    9.70  B    2.9      3
SB  RT        0.19 0.38  60.0   9.52  518    0.02 0.85    8.11  B    1.0      1

DIR Delay LOS
WB   6.10  B
NB   9.64  B
SB   8.11  B
INTERSECTION DELAY =  7.30 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  11.2 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
CHAUNCY/AVE DE LAFAYETTE
NO BUILD CONDITIONS - 2-WAY ESSEX: PM PEAK HOUR
date:01-06-1989             time:14:28:03
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I13NBEP    GEOMETRICS=KBINT13    SIGNAL=KBINT13
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES      LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT     WALK
EB    0    0    0     0  0  0     0.0  0.0  0.0     0
WB    0   68  470     0  2  0     0.0 11.0  0.0    44
NB   63  237    0     1  1  0    11.0 10.0  0.0    40
SB    0    0  252     0  0  1     0.0  0.0 14.0    36

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK              PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%         0     0   .000  100        15.0    0
WB  0.0%  2.0%   Y     0     0   .960  100   N    15.0    3
NB  0.0%  2.0%   Y     0     0   .960  100   N    14.0    3
SB  0.0%  2.0%   N     0     0   .960  100   N    14.0    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1                 *  *              *           *  29.4   3    A
 2           *           *  *  *              *     24.6   3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0    0    0  .000   136 1036    0
WB     0   68  470  .960     0   71  490
NB    63  237    0  .960    66  247    0
SB     0    0  252  .960     0    0  263

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N  LU     v  Plt  Prt
WB  TH-RT      560 2 1.05  588 0.00 0.87
NB  LT          66 1 1.00   66 1.00 0.00
NB  TH         247 1 1.00  247 0.00 0.00
SB  RT         263 1 1.00  263 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT    VOLUME
NORTHBOUND        0    0  263       100    0    0        0   0   1       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
WB  TH-RT      1800  2 0.967 0.990 1.000 1.000 1.000 0.900 0.827 1.000 2566
NB  LT         1800  1 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1473
NB  TH         1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
SB  RT         1800  1 1.067 0.990 1.000 1.000 1.000 0.900 0.802 1.000 1373

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
WB  TH-RT      588 2566 0.23 0.49 1259 0.47     *
NB  LT          66 1473 0.04 0.41  603 0.11
NB  TH         247 1497 0.16 0.41  613 0.40
SB  RT         263 1373 0.19 0.41  562 0.47     *
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CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.42 TOTAL V/C= 0.47

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C      d1    c      d2   PF   Delay LOS Avg Q  95% Q
WB  TH-RT     0.47 0.49  60.0   7.67 1259   0.21 0.85    6.70  B   4.8    5
NB  LT        0.11 0.41  60.0   8.33  603   0.00 1.00    8.33  B   0.6    1
NB  TH        0.40 0.41  60.0   9.53  613   0.25 0.85    8.31  B   2.4    2
SB  RT        0.47 0.41  60.0   9.84  562   0.47 0.85    8.76  B   2.6    3

DIR Delay LOS
WB   6.70  B
NB   8.31  B
SB   8.76  B
INTERSECTION DELAY =  7.60 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  10.8 SECONDS
THE EXISTING TIMING IS OPTIMAL
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LEVEL OF SERVICE CALCULATIONS:

TWO-WAY ESSEX STREET -
400’ TOWER (1993) CONDITIONS
(AM and PM peak hours)

- Summer/Lincoln/Bedford
- Bedford/Chauncy/LP Garage
- Surface Artery/Essex/Lincoln
  two-way Surface Artery
  one-way Surface Artery
- Essex/Kingston/Ave. DeLafayette
- Essex/Washington
- Chauncy/Ave. DeLafayette
- Kingston/KBE Garage
- Lincoln/KBE & 125 Summer Garage

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
SUMMER/LINCOLN/BEDFORD
ALTERNATIVE 1 CONDITIONS - 2-WAY ESSEX: AM PEAK HOUR
date:01-06-1989             time:10:56:45
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2ALT1EA   GEOMETRICS=KBINT2     SIGNAL=KBINT2
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB    0  105    3     0  1  1      0.0 10.0  9.0   36
WB  152  273    0     1  1  0     13.0 13.0  0.0   33
NB  104  350  125     1  1  1     10.0 10.0 10.0   27
SB    0    0    0     0  0  0      0.0  0.0  0.0    0

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS       ARR
DIR GRADE %HV    Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0    0  .910  450  N    14.0    3
WB  0.0%  2.0%   N     0    0  .910 1000  N    14.0    3
NB  0.0%  2.0%   N     0    0  .910  850  N    11.8    3
SB  0.0%  0.0%         0    0  .000    0       11.8    0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1           *           *  *  *  *                 31.5   2    A
 2     *  *        *                 *           *   9.5   2    A
 3              *  *                             *  13.0   2    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0  105    3  .910     0  115    3
WB   152  273    0  .910   167  300    0
NB   104  350  125  .910   114  385  137
SB     0    0    0  .000     0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N    LU     v  Plt  Prt
EB  TH         115 1 1.00  115 0.00 0.00
EB  RT           3 1 1.00    3 0.00 1.00
WB  LT         167 1 1.00  167 1.00 0.00
WB  TH         300 1 1.00  300 0.00 0.00
NB  LT         114 1 1.00  114 1.00 0.00
NB  TH         385 1 1.00  385 0.00 0.00
NB  RT         137 1 1.00  137 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT    VOLUME
WESTBOUND         0  115    3         0    0    0        0   1   1       0
NORTHBOUND        0    0    0         0    0    0        0   0   0       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  TH         1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
EB  RT         1800  1 0.900 0.990 1.000 1.000 1.000 0.900 0.445 1.000  643
WB  LT         1800  1 1.033 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1575
WB  TH         1800  1 1.033 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1657
NB  LT         1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1422
NB  TH          1800   1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
NB  RT          1800   1 0.933 0.990 1.000 1.000 1.000 0.900 0.374 1.000  560

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP      v     s  v/s  g/C     c  v/c  CRITICAL
EB  TH          115 1497 0.08 0.16   236 0.49     *
EB  RT            3  643 0.01 0.16   101 0.03
WB  LT          167 1575 0.11 0.22   342 0.49     *
WB  TH          300 1657 0.18 0.41   676 0.44
NB  LT          114 1422 0.08 0.53   747 0.15
NB  TH          385 1497 0.26 0.53   787 0.49     *
NB  RT          137  560 0.25 0.53   294 0.47

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.44 TOTAL V/C= 0.49

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C      d1     c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH         0.49 0.16  60.0  17.53  236    1.30 0.85  16.01  C   1.6     2
EB  RT         0.03 0.16  60.0  16.26  101    0.00 0.85  13.82  B   0.0     1
WB  LT         0.49 0.22  60.0  15.64  342    0.91 1.00  16.55  C   2.2     3
WB  TH         0.44 0.41  60.0   9.76  676    0.32 0.85   8.57  B   3.0     3
NB  LT         0.15 0.53  60.0   5.58  747    0.01 1.00   5.59  B   0.9     1
NB  TH         0.49 0.53  60.0   6.91  787    0.40 0.85   6.21  B   3.0     3
NB  RT         0.47 0.53  60.0   6.81  294    0.88 0.85   6.53  B   1.1     1

DIR Delay LOS
EB  15.95  C
WB  11.42  B
NB   6.17  B
INTERSECTION DELAY =  9.13 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  11.2 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
SUMMER/LINCOLN/BEDFORD
ALTERNATIVE 1 CONDITIONS - 2-WAY ESSEX: PM PEAK HOUR
date:01-06-1989              time:10:59:43
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2ALT1EP   GEOMETRICS=KBINT2     SIGNAL=KBINT2
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH    RT     LT TH RT      LT   TH   RT     WALK
EB    0  200     5     0  1  1      0.0 10.0  9.0    36
WB  182  195     0     1  1  0     13.0 13.0  0.0    33
NB   69  243   256     1  1  1     10.0 10.0 10.0    27
SB    0    0     0     0  0  0      0.0  0.0  0.0     0

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK              PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N      0     0  .920  450   N    14.0    3
WB  0.0%  2.0%   N      0    21  .920 1000   N    14.0    3
NB  0.0%  2.0%   N      0     0  .920  850   N    11.8    3
SB  0.0%  0.0%          0     0  .000    0        11.8    0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1           *           *  *  *  *                 35.0   2    A
 2     *  *        *                 *           *  10.2   2    A
 3              *  *                             *   8.8   2    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0  200    5  .920     0  217    5
WB   182  195    0  .920   198  212    0
NB    69  243  256  .920    75  264  278
SB     0    0    0  .000     0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N   LU     v  Plt  Prt
EB  TH          217 1 1.00   217 0.00 0.00
EB  RT            5 1 1.00     5 0.00 1.00
WB  LT          198 1 1.00   198 1.00 0.00
WB  TH          212 1 1.00   212 0.00 0.00
NB  LT           75 1 1.00    75 1.00 0.00
NB  TH          264 1 1.00   264 0.00 0.00
NB  RT          278 1 1.00   278 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES      OPPOSING
                 LT   TH   RT         LT   TH   RT        LT  TH  RT    VOLUME
WESTBOUND         0  217    5          0    0    0         0   1   1        0
NORTHBOUND        0    0    0          0    0    0         0   0   0        0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv    Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  TH         1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
EB  RT         1800  1 0.900 0.990 1.000 1.000 1.000 0.900 0.445 1.000  643
WB  LT         1800  1 1.033 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1575
WB  TH         1800  1 1.033 0.990 1.000 1.000 0.913 0.900 1.000 1.000 1512
NB  LT         1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1422
NB  TH          1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
NB  RT          1800  1 0.933 0.990 1.000 1.000 1.000 0.900 0.374 1.000  560

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP      v    s  v/s  g/C     c  v/c  CRITICAL
EB  TH          217 1497 0.15 0.17   255 0.85     *
EB  RT            5  643 0.01 0.17   109 0.05
WB  LT          198 1575 0.13 0.15   232 0.85     *
WB  TH          212 1512 0.14 0.35   530 0.40
NB  LT           75 1422 0.05 0.58   829 0.09
NB  TH          264 1497 0.18 0.58   872 0.30
NB  RT          278  560 0.50 0.58   326 0.85     *

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.77 TOTAL V/C= 0.85

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C      d1     c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH         0.85 0.17  60.0  18.37  255   16.06 0.85   29.27  D   3.3    6
EB  RT         0.05 0.17  60.0  15.84  109    0.00 0.85   13.46  B   0.1    1
WB  LT         0.85 0.15  60.0  18.96  232   17.26 1.00   36.22  D   3.4    7
WB  TH         0.40 0.35  60.0  11.18  530    0.28 0.85    9.74  B   2.3    2
NB  LT         0.09 0.58  60.0   4.19  829    0.00 1.00    4.19  A   0.5    1
NB  TH         0.30 0.58  60.0   4.82  872    0.06 0.85    4.15  A   1.8    2
NB  RT         0.85 0.58  60.0   7.90  326   13.25 0.85   17.98  C   2.4    5

DIR Delay LOS
EB  28.88  D
WB  22.52  C
NB  10.39  B
INTERSECTION DELAY = 17.66 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  31.3 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
BEDFORD/CHAUNCY/LP GARAGE
ALTERNATIVE 1 CONDITIONS - 2-WAY ESSEX: AM PEAK HOUR
date:01-06-1989              time:10:48:34
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I6ALT1EA   GEOMETRICS=KBINT6      SIGNAL=KBINT6
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES        # OF LANES      LANE WIDTH     CROSS
DIR   LT   TH   RT     LT TH RT       LT   TH    RT    WALK
EB    12   45   13      0  1  0      0.0 14.0  0.0     20
WB    78   98   57      0  1  0      0.0 14.0  0.0     32
NB   108  145  130      0  1  0      0.0 14.0  0.0     32
SB     0    0    0      0  0  0      0.0  0.0  0.0      0

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF  CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%   N      0     0  .920  100   N     11.0    3
WB  0.0%  2.0%   N      0     0  .920  300   N     11.0    3
NB  0.0%  2.0%   N      0     0  .920  100   N     11.0    3
SB  0.0%  0.0%          0     0  .000  100   N     11.0    0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *     *  *  *              *           *  17.0   4    A
 2           *           *  *  *  *                 35.0   4    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR   LTV   THV   RTV    PHF   LTFR THFR RTFR
EB     12    45    13   .920     13   49   14
WB     78    98    57   .920     85  107   62
NB    108   145   130   .920    117  158  141
SB      0     0     0   .000      0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N   LU     v  Plt  Prt
EB  LT-TH-RT     76 1 1.00    76 0.17 0.19
WB  LT-TH-RT    253 1 1.00   253 0.33 0.24
NB  LT-TH-RT    416 1 1.00   416 0.28 0.34

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                 OPPOSING APPROACH
BEING OPPOSED        VOLUMES        % OPPOSING LEFT TURN      # LANES      OPPOSING
                  LT    TH    RT      LT    TH    RT        LT  TH  RT     VOLUME
EASTBOUND         85   107    62     100   100   100         0   1   0       168
WESTBOUND         13    49    14     100   100   100         0   1   0        63
NORTHBOUND         0     0     0       0     0     0         0   0   0         0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv    Fgr  Fpark  Fbus  Farea   Frt    Flt     s
EB  LT-TH-RT  1800  1 1.067 1.000 1.000 1.000 1.000 0.900 0.866 1.000 1497
WB  LT-TH-RT  1800  1 1.067 0.990 1.000 1.000 1.000 0.900 0.855 1.000 1463
NB  LT-TH-RT  1800  1 1.067 0.990 1.000 1.000 1.000 0.900 0.806 0.849 1170

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm   Vlt  Plt No   Vo Plto
EB  60  17  1   76   63    13 0.17  1  168 0.33
WB  60  17  1  253  168    85 0.33  1   63 0.17
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CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
EB 1613 0.104 11.998 0.770 0.171  5.014 0.829  3.634    1.462 1.000 1.000
WB 1668 0.038 15.324 0.836 0.335  1.689 0.665  1.157    1.346 1.000 1.000

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s g/C     c  v/c  CRITICAL
EB  LT-TH-RT   76 1497 0.05 0.28  424 0.18
WB  LT-TH-RT  253 1463 0.17 0.28  415 0.61     *
NB  LT-TH-RT  416 1170 0.36 0.58  682 0.61     *

CYCLE= 60.0  LOST= 8.0  SUM V/S CRIT= 0.53 TOTAL V/C= 0.61

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.18 0.28  60.0  12.33  424    0.02 0.85  10.50  B   0.9    1
WB  LT-TH-RT 0.61 0.28  60.0  14.15  415    1.88 0.85  13.63  B   3.0    4
NB  LT-TH-RT 0.61 0.58  60.0   6.15  682    1.16 0.85   6.21  B   2.9    3

DIR Delay LOS
EB  10.50  B
WB  13.63  B
NB   6.21  B
INTERSECTION DELAY =  9.17 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  18.1 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
BEDFORD/CHAUNCY/LP GARAGE
ALTERNATIVE 1 CONDITIONS - 2-WAY ESSEX: PM PEAK HOUR
date:01-06-1989             time:10:52:19
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I6ALT1EP   GEOMETRICS=KBINT6     SIGNAL=KBINT6
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB    74  286  108     0  1  0     0.0 14.0  0.0    20
WB   134   56   54     0  1  0     0.0 14.0  0.0    32
NB    62  168  100     0  1  0     0.0 14.0  0.0    32
SB     0    0    0     0  0  0     0.0  0.0  0.0     0

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%   N     0    0   .920  100   N    11.0    3
WB  0.0%  2.0%   N     0    0   .920  300   N    11.0    3
NB  0.0%  2.0%   N     0    0   .920  100   N    11.0    3
SB  0.0%  0.0%         0    0   .000  100   N    11.0    0

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *     *  *  *              *           *  27.9   4    A
 2           *           *  *  *  *                 24.1   4    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF   LTFR THFR RTFR
EB     74  286  108  .920    80  311  117
WB    134   56   54  .920   146   61   59
NB     62  168  100  .920    67  183  109
SB      0    0    0  .000     0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU     v  Plt  Prt
EB  LT-TH-RT   509 1 1.00  509 0.16 0.23
WB  LT-TH-RT   265 1 1.00  265 0.55 0.22
NB  LT-TH-RT   359 1 1.00  359 0.19 0.30

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT  TH    RT         LT   TH   RT       LT  TH  RT    VOLUME
EASTBOUND       146   61   59        100  100  100        0   1   0      120
WESTBOUND        80  311  117        100  100  100        0   1   0      428
NORTHBOUND        0    0    0          0    0    0        0   0   0        0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv    Fgr Fpark  Fbus Farea   Frt   Flt     s
EB  LT-TH-RT  1800  1 1.067 1.000 1.000 1.000 1.000 0.900 0.858 1.000 1482
WB  LT-TH-RT  1800  1 1.067 0.990 1.000 1.000 1.000 0.900 0.860 0.584  859
NB  LT-TH-RT  1800  1 1.067 0.990 1.000 1.000 1.000 0.900 0.816 0.866 1208

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
EB  60  28  1  509  428   80 0.16  1  120 0.55
WB  60  28  1  265  120  146 0.55  1  428 0.16
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CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
EB 1226 0.098 24.410 0.800 0.158  3.471 0.842  2.750    1.406 1.000 1.000
WB 1691 0.253 16.992 0.607 0.549 10.889 0.451  1.620    1.852 0.584 0.584

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH-RT  509 1482 0.34 0.46  689 0.74     *
WB  LT-TH-RT  265  859 0.31 0.46  399 0.66
NB  LT-TH-RT  359 1208 0.30 0.40  486 0.74     *

CYCLE= 60.0  LOST= 8.0  SUM V/S CRIT= 0.64 TOTAL V/C= 0.74

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.74 0.46  60.0   9.95  689    2.92 0.85   10.94  B   4.5    6
WB  LT-TH-RT 0.66 0.46  60.0   9.45  399    2.86 0.85   10.47  B   2.4    3
NB  LT-TH-RT 0.74 0.40  60.0  11.60  486    4.06 0.85   13.30  B   3.6    5

DIR Delay LOS
EB  10.94  B
WB  10.47  B
NB  13.30  B
INTERSECTION DELAY = 11.58 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  24.5 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/SURFACE ARTERY/LINCOLN STREETS
ALT. 1 - 2-WAY ESSEX - AM PEAK HOUR
date:01-12-1989             time:00:04:23
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I7ALT1EA   GEOMETRICS=KBINT7E    SIGNAL=I7ALT1EA
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES       # OF LANES      LANE WIDTH      CROSS
DIR  LT   TH   RT     LT TH RT       LT    TH   RT     WALK
EB  149  603  183      0  3  1      0.0 10.0 15.0     70
WB   25  277    0      0  2  0      0.0 12.0  0.0     70
NB   54 1131   21      0  3  0      0.0 11.0  0.0     56
SB  160  708  265      0  3  0      0.0 11.0  0.0     66

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK               PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0     0  .870   30   Y     20.5    3
WB  0.0%  2.0%   N    10     0  .870  200   Y     20.5    3
NB  0.0%  2.0%   N     0     0  .870  200   Y     19.5    3
SB  0.0%  2.0%   N     0     0  .870  380   Y     19.5    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *                          *           *  30.3   4    A
 2              *  *  *                             15.2   4    A
 3           *           *              *  *  *     44.4   4    A
 4        *                 *  *  *                 44.0   4    A

CYCLE= 150.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB   149  603  183  .870   171  693  210
WB    25  277    0  .870    29  318    0
NB    54 1131   21  .870    62 1300   24
SB   160  708  265  .870   184  814  305

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N   LU    v  Plt  Prt
EB  LT-TH       864 3 1.10  951 0.20 0.00
EB  RT          210 1 1.00  210 0.00 1.00
WB  LT-TH       347 2 1.05  364 0.08 0.00
NB  LT-TH-RT   1386 3 1.10 1525 0.04 0.02
SB  LT-TH-RT   1302 3 1.10 1433 0.14 0.23

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED         VOLUMES        % OPPOSING LEFT TURN      # LANES      OPPOSING
                   LT   TH   RT          LT    TH    RT        LT  TH  RT     VOLUME
EASTBOUND          29  318    0           0     0     0         0   2   0          0
WESTBOUND         171  693  210           0     0     0         0   3   1          0
NORTHBOUND        184  814  305           0     0     0         0   3   0          0
SOUTHBOUND         62 1300   24           0     0     0         0   3   0          0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP   IDEAL N  Fwid   Fhv    Fgr  Fpark  Fbus  Farea   Frt   Flt     s
EB  LT-TH      1800  3 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.934 4197
EB  RT         1800  1 1.100 0.990 1.000 1.000 1.000 0.900 0.811 1.000 1431
WB  LT-TH      1800  2 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3208
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NB  LT-TH-RT  1800   3 0.967 0.990 1.000 1.000 1.000 0.900 0.997 1.000 4639
SB  LT-TH-RT  1800   3 0.967 0.990 1.000 1.000 1.000 0.900 0.962 0.965 4318

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v     s  v/s  g/C     c  v/c  CRITICAL
EB  LT-TH      951 4197 0.23 0.20   849 1.12     *
EB  RT         210 1431 0.15 0.52   748 0.28
WB  LT-TH      364 3208 0.11 0.10   325 1.12     *
NB  LT-TH-RT 1525 4639 0.33 0.29  1361 1.12     *
SB  LT-TH-RT 1433 4318 0.33 0.30  1279 1.12     *

CYCLE=150.0  LOST=16.0  SUM V/S CRIT= 1.00 TOTAL V/C= 1.12

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C      d1     c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH     1.12 0.20 150.0  46.90  849   66.99 0.85   96.80  F  37.6   71
EB  RT        0.28 0.52 150.0  15.24  748    0.06 0.85   13.01  B   4.2    4
WB  LT-TH     1.12 0.10 150.0  51.92  325   83.29 0.85  114.93  F  17.6   34
NB  LT-TH-RT 1.12 0.29 150.0  42.39 1361   62.12 0.85   88.83  F  54.6  103
SB  LT-TH-RT 1.12 0.30 150.0  42.25 1279   62.67 0.85   89.19  F  51.4   98

DIR Delay LOS
EB   81.62  F
WB 114.93  F
NB   88.83  F
SB   89.19  F
INTERSECTION DELAY = 89.20 INTERSECTION LOS=F

THE CYCLE LENGTH WITHIN THE BOUNDS OF  90  TO  150 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 150.0 SECONDS

THE V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/SURFACE ARTERY/LINCOLN STREETS
ALT. 1 - 2-WAY ESSEX - PM PEAK HOUR
date:01-11-1989             time:23:46:36
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I7ALT1EP   GEOMETRICS=KBINT7E    SIGNAL=I7ALT1EP
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB  148  830  683     0  3  1     0.0 10.0 15.0     70
WB   25  149   10     0  2  0     0.0 12.0  0.0     70
NB   37  600   13     0  3  0     0.0 11.0  0.0     56
SB  114 1237  184     0  3  0     0.0 11.0  0.0     66

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0    0   .940   15   Y    20.5    3
WB  0.0%  2.0%   N    10    0   .940  180   Y    20.5    3
NB  0.0%  2.0%   N     0    0   .940  180   Y    19.5    3
SB  0.0%  2.0%   N     0    0   .940  310   Y    19.5    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *                          *           *  42.5   4    A
 2              *  *  *                              9.1   4    A
 3           *           *              *  *  *     56.3   4    A
 4        *                 *  *  *                 26.1   4    A

CYCLE= 150.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB   148  830  683  .940   157  883  727
WB    25  149   10  .940    27  159   11
NB    37  600   13  .940    39  638   14
SB   114 1237  184  .940   121 1316  196

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N    LU     v  Plt  Prt
EB  LT-TH     1040 3 1.10 1144 0.15 0.00
EB  RT         727 1 1.00  727 0.00 1.00
WB  LT-TH-RT   196 2 1.05  206 0.14 0.05
NB  LT-TH-RT   691 3 1.10  761 0.06 0.02
SB  LT-TH-RT  1633 3 1.10 1796 0.07 0.12

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSIN
                 LT   TH   RT        LT   TH   RT       LT  TH  RT    VOLUME
EASTBOUND        27  159   11         0    0    0        0   2   0       0
WESTBOUND       157  883  727         0    0    0        0   3   1       0
NORTHBOUND      121 1316  196         0    0    0        0   3   0       0
SOUTHBOUND       39  638   14         0    0    0        0   3   0       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt     s
EB  LT-TH     1800  3 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.955 4289
EB  RT        1800  1 1.100 0.990 1.000 1.000 1.000 0.900 0.797 1.000 1406
WB  LT-TH-RT  1800  2 1.000 0.990 1.000 1.000 1.000 0.900 0.992 1.000 3182
NB  LT-TH-RT  1800  3 0.967 0.990 1.000 1.000 1.000 0.900 0.997 1.000 4638
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SB  LT-TH-RT  1800  3 0.967 0.990 1.000 1.000 1.000 0.900 0.981 0.982 4484

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C     c  v/c  CRITICAL
EB  LT-TH     1144 4289 0.27 0.28 1215 0.94
EB  RT         727 1406 0.52 0.48  681 1.07     *
WB  LT-TH-RT   206 3182 0.06 0.06  193 1.07     *
NB  LT-TH-RT   761 4638 0.16 0.17  808 0.94
SB  LT-TH-RT  1796 4484 0.40 0.38 1683 1.07     *

CYCLE=150.0  LOST=12.0  SUM V/S CRIT= 0.98 TOTAL V/C= 1.07

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1     c      d2    PF   Delay LOS Avg Q  95% Q
EB  LT-TH     0.94 0.28 150.0  39.92 1215   10.33 0.85   42.71  E  31.1   38
EB  RT        1.07 0.48 150.0  31.38  681   47.12 0.85   66.72  F  21.3   41
WB  LT-TH-RT  1.07 0.06 150.0  53.79  193   73.55 0.85  108.23  F   9.7   19
NB  LT-TH-RT  0.94 0.17 150.0  46.50  808   13.83 0.85   51.28  E  23.8   30
SB  LT-TH-RT  1.07 0.38 150.0  37.12 1683   37.24 0.85   63.21  F  49.9   87

DIR Delay LOS
EB  52.04  E
WB 108.23  F
NB  51.28  E
SB  63.21  F
INTERSECTION DELAY = 58.73 INTERSECTION LOS=E

THE CYCLE LENGTH WITHIN THE BOUNDS OF  90  TO  150 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 150.0 SECONDS

THE V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS
for chosen cycle length 150.0
suggested timing phase 1 is  42.5 secs green,   4.0 secs yellow + red clear
suggested timing phase 2 is   9.1 secs green,   4.0 secs yellow + red clear
suggested timing phase 3 is  56.3 secs green,   4.0 secs yellow + red clear
suggested timing phase 4 is  26.1 secs green,   4.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/SURFACE ARTERY/LINCOLN STREETS
ALT. 1 - 2-WAY ESSEX/1-WAY S.A. - AM PEAK HOUR
date:01-12-1989             time:00:19:39
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I7AL1ESA   GEOMETRICS=KBINT7ES   SIGNAL=I7AL1ESA
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT    TH   RT    WALK
EB  149  603  183     0  3  1     0.0 10.0 15.0     70
WB   25  277    0     0  2  0     0.0 12.0  0.0     70
NB   54 1131   21     0  3  0     0.0 11.0  0.0     56
SB   80  708  265     0  4  0     0.0 12.0  0.0     66

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK            PEDESTRIANS       ARR
DIR GRADE %HV    Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0    0  .870   30  Y    20.5    3
WB  0.0%  2.0%   N    10    0  .870  200  Y    20.5    3
NB  0.0%  2.0%   N     0    0  .870  200  Y    19.5    3
SB  0.0%  2.0%   N     0    0  .870  380  Y    19.5    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *                          *           *  29.0    4    A
 2              *  *  *                             14.6    4    A
 3           *           *              *  *  *     28.3    4    A
 4        *                 *  *  *                 42.1    4    A

CYCLE= 130.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB   149  603  183  .870   171  693  210
WB    25  277    0  .870    29  318    0
NB    54 1131   21  .870    62 1300   24
SB    80  708  265  .870    92  814  305

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP    FLOW N   LU     v  Plt  Prt
EB  LT-TH        864 3 1.10  951 0.20 0.00
EB  RT           210 1 1.00  210 0.00 1.00
WB  LT-TH        347 2 1.05  364 0.08 0.00
NB  LT-TH-RT    1386 3 1.10 1525 0.04 0.02
SB  LT-TH-RT    1210 4 1.10 1331 0.08 0.25

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSINC
                 LT   TH  RT         LT   TH   RT        LT  TH  RT    VOLUME
EASTBOUND        29  318    0         0    0    0         0   2   0       0
WESTBOUND       171  693  210         0    0    0         0   3   1       0
NORTHBOUND       92  814  305         0    0    0         0   4   0       0
SOUTHBOUND       62 1300   24         0    0    0         0   3   0       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt     s
EB  LT-TH     1800  3 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.934 4197
EB  RT        1800  1 1.100 0.990 1.000 1.000 1.000 0.900 0.811 1.000 1431
WB  LT-TH     1800  2 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3208
NB  LT-TH-RT  1800  3 0.967 0.990 1.000 1.000 1.000 0.900 0.997 1.000 4639
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SB  LT-TH-RT  1800  4 1.000 0.990 1.000 1.000 1.000 0.900 0.959 0.981 6036

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH      951 4197 0.23 0.22  937 1.01     *
EB  RT         210 1431 0.15 0.58  827 0.25
WB  LT-TH      364 3208 0.11 0.11  359 1.01     *
NB  LT-TH-RT  1525 4639 0.33 0.32 1503 1.01     *
SB  LT-TH-RT  1331 6036 0.22 0.22 1313 1.01     *

CYCLE=130.0  LOST=16.0  SUM V/S CRIT= 0.89 TOTAL V/C= 1.01

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP   v/c  g/C   C      d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH     1.01 0.22 130.0  38.52  937   26.09 0.85  54.92  E  25.3   40
EB  RT        0.25 0.58 130.0  10.30  827    0.04 0.85   8.79  B   3.2    3
WB  LT-TH     1.01 0.11 130.0  43.95  359   40.44 0.85  71.73  F  12.5   22
NB  LT-TH-RT  1.01 0.32 130.0  33.62 1503   21.20 0.85  46.60  E  34.9   55
SB  LT-TH-RT  1.01 0.22 130.0  38.81 1313   22.49 0.85  52.11  E  34.6   53

DIR Delay LOS
EB  46.57  E
WB  71.73  F
NB  46.60  E
SB  52.11  E
INTERSECTION DELAY = 50.35 INTERSECTION LOS=E

THE CYCLE LENGTH WITHIN THE BOUNDS OF  90  TO  150 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 130.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 251.0 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/SURFACE ARTERY/LINCOLN STREETS
ALT.1 - 2-WAY ESSEX/1-WAY S.A. - PM PEAK HOUR
date:01-12-1989             time:00:33:03
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I7AL1ESP   GEOMETRICS=KBINT7ES   SIGNAL=I7AL1ESP
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB  148  830  683     0  3  1     0.0 10.0 15.0    70
WB   25  149   10     0  2  0     0.0 12.0  0.0    70
NB   37  600   13     0  3  0     0.0 11.0  0.0    56
SB   38 1237  184     0  4  0     0.0 12.0  0.0    66

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0    0   .940   15   Y    20.5    3
WB  0.0%  2.0%   N    10    0   .940  180   Y    20.5    3
NB  0.0%  2.0%   N     0    0   .940  180   Y    19.5    3
SB  0.0%  2.0%   N     0    0   .940  310   Y    19.5    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *  *                          *           *  30.5   4    A
 2              *  *  *                              6.7   4    A
 3           *           *              *  *  *     28.1   4    A
 4        *                 *  *  *                 18.7   4    A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB   148  830  683  .940   157  883  727
WB    25  149   10  .940    27  159   11
NB    37  600   13  .940    39  638   14
SB    38 1237  184  .940    40 1316  196

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
EB  LT-TH     1040 3 1.10 1144 0.15 0.00
EB  RT         727 1 1.00  727 0.00 1.00
WB  LT-TH-RT   196 2 1.05  206 0.14 0.05
NB  LT-TH-RT   691 3 1.10  761 0.06 0.02
SB  LT-TH-RT  1552 4 1.10 1707 0.03 0.13

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN   # LANES      OPPOSIN
                 LT    TH    RT        LT   TH   RT        LT  TH  RT     VOLUME
EASTBOUND        27   159    11         0    0    0         0   2   0       0
WESTBOUND       157   883   727         0    0    0         0   3   1       0
NORTHBOUND       40  1316   196         0    0    0         0   4   0       0
SOUTHBOUND       39   638    14         0    0    0         0   3   0       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt     s
EB  LT-TH     1800  3 0.933 0.990 1.000 1.000 1.000 0.900 1.000 0.955 4289
EB  RT        1800  1 1.100 0.990 1.000 1.000 1.000 0.900 0.797 1.000 1406
WB  LT-TH-RT  1800  2 1.000 0.990 1.000 1.000 1.000 0.900 0.992 1.000 3182
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NB  LT-TH-RT  1800  3 0.967 0.990 1.000 1.000 1.000 0.900 0.997 1.000 4638
SB  LT-TH-RT  1800  4 1.000 0.990 1.000 1.000 1.000 0.900 0.980 0.994 6250

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v     s  v/s  g/C     c  v/c  CRITICAL
EB  LT-TH    1144 4289 0.27 0.30 1307 0.88
EB  RT        727 1406 0.52 0.53  748 0.97      *
WB  LT-TH-RT  206 3182 0.06 0.07  212 0.97      *
NB  LT-TH-RT  761 4638 0.16 0.19  869 0.88
SB  LT-TH-RT 1707 6250 0.27 0.28 1758 0.97      *

CYCLE=100.0  LOST=12.0  SUM V/S CRIT= 0.85 TOTAL V/C= 0.97

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1     c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH     0.88 0.30 100.0  25.05 1307    4.96 0.85   25.51  D  20.1    23
EB  RT        0.97 0.53 100.0  17.21  748   19.26 0.85   31.00  D  11.0    20
WB  LT-TH-RT  0.97 0.07 100.0  35.40  212   39.73 0.85   63.86  F   6.0    11
NB  LT-TH-RT  0.88 0.19 100.0  30.02  869    7.07 0.85   31.52  D  15.6    19
SB  LT-TH-RT  0.97 0.28 100.0  27.00 1758   11.32 0.85   32.58  D  31.0    43

DIR Delay LOS
EB  27.64  D
WB  63.86  F
NB  31.52  D
SB  32.58  D
INTERSECTION DELAY = 31.78 INTERSECTION LOS=D

THE CYCLE LENGTH WITHIN THE BOUNDS OF  90  TO  150 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 119.4 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
KINGSTON/ESSEX/AVE DE LAFAYETTE
ALTERNATIVE 1 CONDITIONS - 2-WAY ESSEX: AM PEAK HOUR
date:01-06-1989             time:09:07:03
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I9ALT1EA   GEOMETRICS=I9ALT1E    SIGNAL=I9ALT1E
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT       LT   TH   RT    WALK
EB    0  665   44     0  2  1     0.0 11.0 10.0    35
WB    0  682    0     0  2  0     0.0 11.0  0.0    35
NB    0    0    0     0  0  0     0.0  0.0  0.0    33
SB  277  112   37     1  1  1    12.0 12.0 10.0    35

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%   N    0     0   .940  150   Y    12.8    3
WB  0.0%  2.0%   N    0     0   .940  100   Y    12.8    3
NB  0.0%  0.0%   N    0     0   .000  100   Y    12.8    0
SB  0.0%  2.0%   N    0     0   .940  200   Y    12.8    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1     *  *        *                 *           *  30.2   3    A
 2           *           *              *  *  *     23.8   3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB      0  665   44  .940     0  707   47
WB      0  682    0  .940     0  726    0
NB      0    0    0  .000     0    0    0
SB    277  112   37  .940   295  119   39

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU     v Plt  Prt
EB  TH         707 2 1.05  743 0.00 0.00
EB  RT          47 1 1.00   47 0.00 1.00
WB  TH         726 2 1.05  762 0.00 0.00
SB  LT         295 1 1.00  295 1.00 0.00
SB  TH         119 1 1.00  119 0.00 0.00
SB  RT          39 1 1.00   39 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN   # LANES      OPPOSING
                 LT   TH   RT       LT   TH   RT       LT  TH  RT    VOLUME
SOUTHBOUND        0    0    0         0    0    0        0   0   0       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  TH         1800  2 0.967 1.000 1.000 1.000 1.000 0.900 1.000 1.000 3132
EB  RT         1800  1 0.933 1.000 1.000 1.000 1.000 0.900 0.802 1.000 1213
WB  TH         1800  2 0.967 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3101
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SB  LT         1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
SB  TH         1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604
SB  RT         1800  1 0.933 0.990 1.000 1.000 1.000 0.900 0.779 1.000 1166

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v     s  v/s  g/C     c  v/c  CRITICAL
EB  TH         743 3132 0.24 0.50 1577 0.47
EB  RT          47 1213 0.04 0.50  611 0.08
WB  TH         762 3101 0.25 0.50 1562 0.49      *
SB  LT         295 1524 0.19 0.40  604 0.49      *
SB  TH         119 1604 0.07 0.40  636 0.19
SB  RT          39 1166 0.03 0.40  462 0.09

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.44 TOTAL V/C= 0.49

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C      d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH        0.47 0.50  60.0   7.37 1577   0.17 0.85   6.41  B   5.9    6
EB  RT        0.08 0.50  60.0   5.84  611   0.00 0.85   4.97  A   0.4    1
WB  TH        0.49 0.50  60.0   7.45 1562   0.20 0.85   6.50  B   6.0    6
SB  LT        0.49 0.40  60.0  10.30  604   0.51 1.00  10.81  B   3.0    3
SB  TH        0.19 0.40  60.0   8.97  636   0.02 0.85   7.64  B   1.2    1
SB  RT        0.09 0.40  60.0   8.60  462   0.00 0.85   7.31  B   0.4    1

DIR Delay LOS
EB   6.32  B
WB   6.50  B
SB   9.67  B
INTERSECTION DELAY =  7.15 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  11.2 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
KINGSTON/ESSEX/AVE DE LAFAYETTE
ALTERNATIVE 1 CONDITIONS - 2-WAY ESSEX: PM PEAK HOUR
date:01-06-1989             time:09:45:13
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I9ALT1EP   GEOMETRICS=KBINT9E    SIGNAL=KBINT9E
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES       # OF LANES     LANE WIDTH      CROSS
DIR  LT   TH   RT     LT TH RT      LT   TH   RT     WALK
EB     0 1082  135     0  2  1     0.0 11.0 10.0     35
WB     0  488    0     0  2  0     0.0 11.0  0.0     35
NB     0    0    0     0  0  0     0.0  0.0  0.0     33
SB   594  393   79     1  1  1    12.0 12.0 10.0     35

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS       ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%   N     0    0   .960  150   Y    12.8    3
WB  0.0%  2.0%   N     0    0   .960  100   Y    12.8    3
NB  0.0%  0.0%   N     0    0   .000  100   Y    12.8    0
SB  0.0%  2.0%   N     0    0   .960  200   Y    12.8    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1     *  *        *                 *           *  26.0   3    A
 2           *           *              *  *  *     28.0   3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB      0 1082  135  .960     0 1127  141
WB      0  488    0  .960     0  508    0
NB      0    0    0  .000     0    0    0
SB    594  393   79  .960   619  409   82

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
EB  TH        1127 2 1.05 1183 0.00 0.00
EB  RT         141 1 1.00  141 0.00 1.00
WB  TH         508 2 1.05  534 0.00 0.00
SB  LT         619 1 1.00  619 1.00 0.00
SB  TH         409 1 1.00  409 0.00 0.00
SB  RT          82 1 1.00   82 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT     VOLUME
SOUTHBOUND        0    0    0         0    0    0        0   0   0        0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  TH        1800  2 0.967 1.000 1.000 1.000 1.000 0.900 1.000 1.000 3132
EB  RT        1800  1 0.933 1.000 1.000 1.000 1.000 0.900 0.802 1.000 1213
WB  TH        1800  2 0.967 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3101
SB  LT        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1524
SB  TH        1800  1 1.000 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1604
SB  RT        1800  1 0.933 0.990 1.000 1.000 1.000 0.900 0.779 1.000 1166

CAPACITY ANALYSIS WORKSHEET
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DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  TH       1183 3132 0.38 0.43 1359 0.87      *
EB  RT        141 1213 0.12 0.43  526 0.27
WB  TH        534 3101 0.17 0.43 1345 0.40
SB  LT        619 1524 0.41 0.47  710 0.87      *
SB  TH        409 1604 0.26 0.47  748 0.55
SB  RT         82 1166 0.07 0.47  543 0.15

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.78 TOTAL V/C= 0.87

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH       0.87 0.43  60.0  11.75 1359    4.60 0.85   13.89  B  10.6   14
EB  RT       0.27 0.43  60.0   8.27  526    0.07 0.85    7.09  B   1.3    1
WB  TH       0.40 0.43  60.0   8.83 1345    0.11 0.85    7.59  B   4.8    5
SB  LT       0.87 0.47  60.0  10.94  710    8.06 1.00   19.00  C   6.0   11
SB  TH       0.55 0.47  60.0   8.72  748    0.66 0.85    7.98  B   3.6    4
SB  RT       0.15 0.47  60.0   6.99  543    0.01 0.85    5.95  B   0.7    1

DIR Delay LOS
EB  13.17  B
WB   7.59  B
SB  13.97  B
INTERSECTION DELAY = 12.47 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  34.3 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/WASHINGTON
ALTERNATIVE 1 CONDITIONS - 2-WAY ESSEX: AM PEAK HOUR
date:01-06-1989              time:10:40:28
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I11AL1EA   GEOMETRICS=KBINT11    SIGNAL=KBINT11
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB  165  793    0     1  2  0    11.0 11.0  0.0    28
WB    0    0    0     0  0  0     0.0  0.0  0.0    31
NB    0  371  494     0  2  1     0.0 11.0 11.0    36
SB    0    0    0     0  0  0     0.0  0.0  0.0    36

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0    0  .930  200   Y    11.8     3
WB  0.0%  0.0%         0    0  .000  200        11.8     0
NB  0.0%  2.0%   N     0    0  .930  550   Y    13.0     3
SB  0.0%  0.0%         0    0  .000  750   Y    13.0     3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *                             *           *  21.0   3    A
 2           *           *     *  *                 33.0   3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV    PHF  LTFR THFR RTFR
EB   165  793    0  .930   177  853    0
WB     0    0    0  .000     0    0    0
NB     0  371  494  .930     0  399  531
SB     0    0    0  .000     0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
EB  LT         177 1 1.00  177 1.00 0.00
EB  TH         853 2 1.05  895 0.00 0.00
NB  TH         399 2 1.05  419 0.00 0.00
NB  RT         531 1 1.00  531 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT     VOLUME
EASTBOUND         0    0    0         0    0    0        0   0   0        0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid    Fhv    Fgr Fpark  Fbus Farea    Frt    Flt     s
EB  LT         1800  1 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1473
EB  TH         1800  2 0.967 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3101
NB  TH         1800  2 0.967 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3101
NB  RT         1800  1 0.967 0.990 1.000 1.000 1.000 0.900 0.755 1.000 1170

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT        177 1473 0.12 0.35  515 0.34
EB  TH        895 3101 0.29 0.35 1085 0.83     *
NB  TH        419 3101 0.14 0.55 1706 0.25
NB  RT        531 1170 0.45 0.55  644 0.83     *

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.74 TOTAL V/C= 0.83

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT       0.34 0.35  60.0  10.96  515    0.17 1.00   11.12  B   1.9    2
EB  TH       0.83 0.35  60.0  13.55 1085    3.76 0.85   14.71  B   9.2   11
NB  TH       0.25 0.55  60.0   5.34 1706    0.02 0.85    4.55  A   3.0    3
NB  RT       0.83 0.55  60.0   8.45  644    6.03 0.85   12.31  B   4.0    6

DIR Delay LOS
EB  14.11  B
NB   8.89  B
INTERSECTION DELAY = 11.66 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  27.5 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ESSEX/WASHINGTON
ALTERNATIVE 1 CONDITIONS - 2-WAY ESSEX: PM PEAK HOUR
date:01-11-1989              time:08:22:14
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I11AL1EP   GEOMETRICS=KBINT11M   SIGNAL=KBINT11
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES       # OF LANES      LANE WIDTH     CROSS
DIR  LT   TH    RT     LT TH RT       LT    TH    RT     WALK
EB  124  961     0      0  3  0      0.0 11.0  0.0     28
WB    0    0     0      0  0  0      0.0  0.0  0.0     31
NB    0  151   664      0  2  1      0.0 11.0 11.0     36
SB    0    0     0      0  0  0      0.0  0.0  0.0     36

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK                PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%   N     0     0   .910  200   Y     11.8    3
WB  0.0%  0.0%         0     0   .000  200         11.8    0
NB  0.0%  2.0%   N     0     0   .910  590   Y     13.0    3
SB  0.0%  0.0%         0     0   .000  750   Y     13.0    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *                                *           *  27.2    3    A
 2           *           *     *  *                    56.8    3    A

CYCLE=  90.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR   LTV   THV  RTV    PHF   LTFR THFR RTFR
EB    124   961    0  .910    136 1056    0
WB      0     0    0  .000      0    0    0
NB      0   151  664  .910      0  166  730
SB      0     0    0  .000      0    0    0

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP   FLOW N    LU     v  Plt  Prt
EB  LT-TH      1192 3 1.10 1312 0.11 0.00
NB  TH          166 2 1.05  174 0.00 0.00
NB  RT          730 1 1.00  730 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                  OPPOSING APPROACH
BEING OPPOSED         VOLUMES       % OPPOSING LEFT TURN     # LANES     OPPOSING
                  LT    TH    RT          LT    TH    RT        LT  TH  RT     VOLUME
EASTBOUND          0     0     0           0     0     0         0   0   0          0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP   IDEAL N   Fwid    Fhv    Fgr Fpark  Fbus Farea   Frt   Flt     s
EB  LT-TH      1800  3 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.942 4382
NB  TH         1800  2 0.967 0.990 1.000 1.000 1.000 0.900 1.000 1.000 3101
NB  RT         1800  1 0.967 0.990 1.000 1.000 1.000 0.900 0.755 1.000 1170

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v     s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH     1312 4382 0.30 0.30 1326 0.99      *
NB  TH         174 3101 0.06 0.63 1956 0.09
NB  RT         730 1170 0.62 0.63  738 0.99      *

CYCLE= 90.0  LOST= 6.0  SUM V/S CRIT= 0.92 TOTAL V/C= 0.99
```

```
LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C      d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH     0.99 0.30  90.0  23.73 1326   16.66 0.85   34.34  D  21.8   35
NB  TH        0.09 0.63  90.0   4.94 1956    0.00 0.85    4.20  A   1.5    2
NB  RT        0.99 0.63  90.0  12.39  738   22.93 0.85   30.03  D   9.5   19

DIR Delay LOS
EB  34.34  D
NB  25.05  D
INTERSECTION DELAY = 30.55 INTERSECTION LOS=D

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  90.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 209.7 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
CHAUNCY/AVE DE LAFAYETTE
ALTERNATIVE 1 CONDITIONS - 2-WAY ESSEX: AM PEAK HOUR
date:01-06-1989              time:10:13:37
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I13AL1EA   GEOMETRICS=KBINT13    SIGNAL=KBINT13
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES       # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT     LT TH RT     LT   TH   RT     WALK
EB    0    0    0      0  0  0     0.0  0.0  0.0     44
WB    0  668   51      0  2  0     0.0 11.0  0.0     44
NB   87  322    0      1  1  0    11.0 10.0  0.0     40
SB    0    0   91      0  0  1     0.0  0.0 14.0     36

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK               PEDESTRIANS       ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%         0     0  .000  100   N    15.0    0
WB  0.0%  2.0%   Y     0     0  .940  100   N    15.0    3
NB  0.0%  2.0%   Y     0     0  .940  100   N    14.0    3
SB  0.0%  2.0%   N     0     0  .940  100   N    14.0    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN   Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1                 *  *              *           *  28.9   3    A
 2             *           *  *  *           *      25.1   3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0    0    0  .000    0    0    0
WB     0  668   51  .940    0  711   54
NB    87  322    0  .940   93  343    0
SB     0    0   91  .940    0    0   97

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
WB  TH-RT      765 2 1.05  803 0.00 0.07
NB  LT          93 1 1.00   93 1.00 0.00
NB  TH         343 1 1.00  343 0.00 0.00
SB  RT          97 1 1.00   97 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED      VOLUMES       % OPPOSING LEFT TURN    # LANES      OPPOSING
                 LT   TH   RT        LT    TH    RT      LT  TH  RT     VOLUME
NORTHBOUND        0    0   97       100     0     0       0   0   1        0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr  Fpark  Fbus Farea   Frt   Flt    s
WB  TH-RT     1800  2 0.967 0.990 1.000 1.000 1.000 0.900 0.986 1.000 3058
NB  LT        1800  1 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1473
NB  TH        1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
SB  RT        1800  1 1.067 0.990 1.000 1.000 1.000 0.900 0.802 1.000 1373

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v    s  v/s  g/C    c  v/c  CRITICAL
WB  TH-RT      803 3058 0.26 0.48 1471 0.55     *
NB  LT          93 1473 0.06 0.42  617 0.15
NB  TH         343 1497 0.23 0.42  627 0.55     *
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SB  RT         97 1373 0.07 0.42  575 0.17

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.49 TOTAL V/C= 0.55

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1     c      d2   PF   Delay LOS Avg Q  95% Q
WB  TH-RT    0.55 0.48  60.0   8.33 1471    0.34 0.85    7.37  B   6.6    7
NB  LT       0.15 0.42  60.0   8.21  617    0.01 1.00    8.22  B   0.9    1
NB  TH       0.55 0.42  60.0   9.98  627    0.78 0.85    9.14  B   3.3    3
SB  RT       0.17 0.42  60.0   8.28  575    0.01 0.85    7.05  B   0.9    1

DIR Delay LOS
WB   7.37  B
NB   8.95  B
SB   7.05  B
INTERSECTION DELAY =  7.86 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  12.4 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
CHAUNCY/AVE DE LAFAYETTE
ALTERNATIVE 1 CONDITIONS - 2-WAY ESSEX: PM PEAK HOUR
date:01-06-1989             time:10:20:02
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I13AL1EP  GEOMETRICS=KBINT13    SIGNAL=KBINT13
LOCATED IN CBD:Y
VOLUME & GEOMETRICS
        VOLUMES      # OF LANES     LANE WIDTH     CROSS
DIR  LT   TH   RT    LT TH RT      LT   TH   RT    WALK
EB    0    0    0     0  0  0     0.0  0.0  0.0    44
WB    0   68  499     0  2  0     0.0 11.0  0.0    44
NB   63  263    0     1  1  0    11.0 10.0  0.0    40
SB    0    0  252     0  0  1     0.0  0.0 14.0    36

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK             PEDESTRIANS        ARR
DIR GRADE %HV   Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  0.0%         0    0   .000  100   N    15.0    0
WB  0.0%  2.0%   Y     0    0   .960  100   N    15.0    3
NB  0.0%  2.0%   Y     0    0   .960  100   N    14.0    3
SB  0.0%  2.0%   N     0    0   .960  100   N    14.0    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1                 *  *              *           *  30.2   3    A
 2           *           *  *  *              *     23.8   3    A

CYCLE=  60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB      0    0    0  .000     0    0    0
WB      0   68  499  .960     0   71  520
NB     63  263    0  .960    66  274    0
SB      0    0  252  .960     0    0  263

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v Plt  Prt
WB  TH-RT      591 2 1.05  620 0.00 0.88
NB  LT          66 1 1.00   66 1.00 0.00
NB  TH         274 1 1.00  274 0.00 0.00
SB  RT         263 1 1.00  263 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN                OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT    VOLUME
NORTHBOUND        0    0  263       100    0    0        0   0   1       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
WB  TH-RT     1800  2 0.967 0.990 1.000 1.000 1.000 0.900 0.826 1.000 2562
NB  LT        1800  1 0.967 0.990 1.000 1.000 1.000 0.900 1.000 0.950 1473
NB  TH        1800  1 0.933 0.990 1.000 1.000 1.000 0.900 1.000 1.000 1497
SB  RT        1800  1 1.067 0.990 1.000 1.000 1.000 0.900 0.802 1.000 1373

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
WB  TH-RT     620 2562 0.24 0.50 1288 0.48     *
NB  LT         66 1473 0.04 0.40  585 0.11
NB  TH        274 1497 0.18 0.40  595 0.46
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SB  RT        263 1373 0.19 0.40  545 0.48     *

CYCLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.43 TOTAL V/C= 0.48

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1     c      d2   PF   Delay LOS Avg Q  95% Q
WB  TH-RT    0.48 0.50  60.0   7.44 1288    0.23 0.85    6.52  B   4.9    5
NB  LT       0.11 0.40  60.0   8.67  585    0.00 1.00    8.68  B   0.7    1
NB  TH       0.46 0.40  60.0  10.14  595    0.42 0.85    8.98  B   2.8    3
SB  RT       0.48 0.40  60.0  10.24  545    0.54 0.85    9.17  B   2.6    3

DIR Delay LOS
WB   6.52  B
NB   8.92  B
SB   9.17  B
INTERSECTION DELAY =  7.75 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  11.0 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:01-08-1989             TIME:20:10:16
KINGSTON/KBE GARAGE - ALTERNATIVE 1 CONDITIONS - 2-WAY ESSEX: AM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=I14AL1EA   GEOMETRICS=KBINT14
KEY:   D
       |
     A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
          FROM D: YIELD
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: KBE GARAGE
EXCLUSIVE LEFT TURN LANES: YES
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D:
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: KINGSTON NB B: KINGSTON SB C: KBE GARAGE  D:
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.50           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: KINGSTON NB B: KINGSTON SB C: KBE GARAGE  D:
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0    0    1  125  351    0   45   30    0    0    0    1
PHF               0.94           0.94           0.94           0.94
ADJ VOLUME        0    0    1  133  373    0   48   32    0    0    0    1
PERCENT GRADE     0.00          -1.00           2.00
PERCENT CYCLES      0.00           0.00           0.00           0.00
PASSENGER CARS      0.00          98.00          %100.00           0.00
PERCENT LT TRU      0.00           0.00           0.00           0.00
PERCENT HV TRU      0.00           2.00           0.00           0.00
PASS CAR/HR       0            129             57   38    0    0    0    1

STEP 1 RIGHT TURNS FROM     C:KBE GARAGE             D:
CONFLICTING FLOWS                        1                 187
CRITICAL GAPS                          5.0                 4.5
CAPACITY                              1199                1108
CAPACITY USED                           0%                  0%
IMPEDANCE FACTOR                      1.00                1.00
ACTUAL CAPACITY                       1199                1108
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1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:01-08-1989            TIME:20:10:16
KINGSTON/KBE GARAGE - ALTERNATIVE 1 CONDITIONS - 2-WAY ESSEX: AM PEAK HOUR

STEP 2 LEFT TURNS FROM     B:KINGSTON SB            A:KINGSTON NB
CONFLICTING FLOWS                        1                   373
CRITICAL GAPS                          4.5                   4.5
CAPACITY                              1308                   930
CAPACITY USED                          10%                    0%
IMPEDANCE FACTOR                      0.94                  1.00
ACTUAL CAPACITY                       1308                   930

STEP 3 THRU MOVES FROM     C:KBE GARAGE             D:
CONFLICTING FLOWS                      507                   507
CRITICAL GAPS                          6.0                   5.0
CAPACITY                               545                   709
CAPACITY USED                           7%                    0%
IMPEDANCE FACTOR                      0.96                  1.00
ACTUAL CAPACITY                        513                   666

STEP 4 LEFT TURNS FROM     C:KBE GARAGE             D:
CONFLICTING FLOWS                      508                   539
CRITICAL GAPS                          6.0                   5.5
CAPACITY                               545                   596
ACTUAL CAPACITY                        512                   538

                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT               DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUEU

LT FROM B:                129       1308      1179    A      3.05         0.11

LT FROM C:                 57        512       454    A      7.92         0.13
SHARED TH/RT FROM C:       38        513       474    A      7.59         0.08

ALL MOVES FROM D:           1       1108      1107    A      3.25         0.00
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:01-08-1989             TIME:20:15:56
KINGSTON/KBE GARAGE - ALTERNATIVE 1 CONDITIONS - 2-WAY ESSEX: PM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=I14AL1EP   GEOMETRICS=KBINT14
KEY:   D
       |
     A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
          FROM D: YIELD
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: KBE GARAGE
EXCLUSIVE LEFT TURN LANES: YES
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D:
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: KINGSTON NB B: KINGSTON SB C: KBE GARAGE  D:
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.50           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: KINGSTON NB B: KINGSTON SB C: KBE GARAGE  D:
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0    0    1   109  841   0  130   86    0    0    0    1
PHF               0.96           0.96           0.96           0.94
ADJ VOLUME        0    0    1   114  876   0  135   90    0    0    0    1
PERCENT GRADE     0.00          -1.00           2.00
PERCENT CYCLES      0.00           0.00           0.00           0.00
PASSENGER CARS      0.00          98.00          %100.00           0.00
PERCENT LT TRU      0.00           0.00           0.00           0.00
PERCENT HV TRU      0.00           2.00           0.00           0.00
PASS CAR/HR       0             110           163   108   0    0    0    1

STEP 1 RIGHT TURNS FROM     C:KBE GARAGE             D:
CONFLICTING FLOWS                        1                 438
CRITICAL GAPS                          5.0                 4.5
CAPACITY                              1199                 874
CAPACITY USED                            0%                  0%
IMPEDANCE FACTOR                      1.00                1.00
ACTUAL CAPACITY                       1199                 874
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1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:01-08-1989             TIME:20:15:56
KINGSTON/KBE GARAGE - ALTERNATIVE 1 CONDITIONS - 2-WAY ESSEX: PM PEAK HOUR

STEP 2 LEFT TURNS FROM     B:KINGSTON SB            A:KINGSTON NB
CONFLICTING FLOWS                        1                876
CRITICAL GAPS                          4.5                4.5
CAPACITY                              1308                555
CAPACITY USED                            8%                 0%
IMPEDANCE FACTOR                      0.95               1.00
ACTUAL CAPACITY                       1308                555

STEP 3 THRU MOVES FROM     C:KBE GARAGE             D:
CONFLICTING FLOWS                      990                991
CRITICAL GAPS                          6.0                5.0
CAPACITY                               277                402
CAPACITY USED                           39%                 0%
IMPEDANCE FACTOR                      0.69               1.00
ACTUAL CAPACITY                        264                382

STEP 4 LEFT TURNS FROM     C:KBE GARAGE             D:
CONFLICTING FLOWS                      991               1080
CRITICAL GAPS                          6.0                5.5
CAPACITY                               277                294
ACTUAL CAPACITY                        263                192

                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT               DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUEUE

LT FROM B:               110       1308      1198     A      3.00         0.09

LT FROM C:               163        263       101     D     35.74         1.61
SHARED TH/RT FROM C:     108        264       156     D     23.04         0.69

ALL MOVES FROM D:          1        874       873     A      4.13         0.00
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:01-06-1989             TIME:15:35:48
LINCOLN/KBE GARAGE - ALTERNATIVE 1 CONDITIONS - 2-WAY ESSEX: AM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=I15AL1EA   GEOMETRICS=KBINT15A
KEY:   D
       |
     A-|-B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: YIELD
          FROM D: YIELD
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: YES
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: 125 SUMMER
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: KBE GARAGE
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: LINCOLN NB  B: LINCOLN SB  C: 125 SUMMER  D: KBE GARAGE
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: LINCOLN NB  B: LINCOLN SB  C: 125 SUMMER  D: KBE GARAGE
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME          160  560  164    0    0    1    0    0   19    0    0    1
PHF               0.91           0.91           0.91           0.91
ADJ VOLUME      176  615  180    0    0    1    0    0   21    0    0    1
PERCENT GRADE     0.00           0.00           0.00
PERCENT CYCLES      0.00           0.00           0.00           0.00
PASSENGER CARS     98.00           0.00          %100.00           0.00
PERCENT LT TRU      0.00           0.00           0.00           0.00
PERCENT HV TRU      2.00           0.00           0.00           0.00
PASS CAR/HR     179              0              0    0   21    0    0    1


STEP 1 RIGHT TURNS FROM     C:125 SUMMER             D:KBE GARAGE
CONFLICTING FLOWS                      308                   1
CRITICAL GAPS                          4.5                 4.5
CAPACITY                               990                1308
CAPACITY USED                            2%                  0%
IMPEDANCE FACTOR                      0.99                1.00
ACTUAL CAPACITY                        990                1308
```

```
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:01-06-1989             TIME:15:35:48
LINCOLN/KBE GARAGE - ALTERNATIVE 1 CONDITIONS - 2-WAY ESSEX: AM PEAK HOUR

STEP 2 LEFT TURNS FROM     B:LINCOLN SB             A:LINCOLN NB
CONFLICTING FLOWS                      615                   1
CRITICAL GAPS                          4.5                 4.5
CAPACITY                               732                1308
CAPACITY USED                            0%                 14%
IMPEDANCE FACTOR                      1.00                0.91
ACTUAL CAPACITY                        732                1308


STEP 3 THRU MOVES FROM     C:125 SUMMER             D:KBE GARAGE
CONFLICTING FLOWS                      792                 792
CRITICAL GAPS                          5.0                 5.0
CAPACITY                               511                 512
CAPACITY USED                            0%                  0%
IMPEDANCE FACTOR                      1.00                1.00
ACTUAL CAPACITY                        466                 466


STEP 4 LEFT TURNS FROM     C:125 SUMMER             D:KBE GARAGE
CONFLICTING FLOWS                      793                 813
CRITICAL GAPS                          5.5                 5.5
CAPACITY                               433                 422
ACTUAL CAPACITY                        394                 381


                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT               DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC)  AVG QUEUE

LT FROM A:               179       1308      1128     A      3.19         0.16

ALL MOVES FROM C:         21        990       970     A      3.71         0.02

ALL MOVES FROM D:          1       1308      1307     A      2.75         0.00
```

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:01-06-1989             TIME:15:46:42
LINCOLN/KBE GARAGE - ALTERNATIVE 1 CONDITIONS - 2-WAY ESSEX: PM PEAK HOUR


LAST DATASETS LOADED OR SAVED
VOLUME=I15AL1EP   GEOMETRICS=KBINT15A
KEY:   D
       |
     A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
          FROM D: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: YES
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

APPROACH: C: 125 SUMMER
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: KBE GARAGE
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: LINCOLN NB  B: LINCOLN SB  C: 125 SUMMER  D: KBE GARAGE
LEFTS             0.00           0.00           0.00           0.00
THRUS             0.00           0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00           0.00


APPROACH        A: LINCOLN NB  B: LINCOLN SB  C: 125 SUMMER  D: KBE GARAGE
                 LT   TH   RT   LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0  396   31    0    0    1    0    0  145   27    0    0
PHF               0.92           0.92           0.92           0.92
ADJ VOLUME        0  430   34    0    0    1    0    0  158   29    0    0
PERCENT GRADE     0.00           0.00           0.00
PERCENT CYCLES      0.00           0.00           0.00           0.00
PASSENGER CARS     98.00           0.00         %100.00            0.00
PERCENT LT TRU      0.00           0.00           0.00           0.00
PERCENT HV TRU      2.00           0.00           0.00           0.00
PASS CAR/HR       0              0              0    0  158   32    0    0


STEP 1 RIGHT TURNS FROM     C:125 SUMMER             D:KBE GARAGE
CONFLICTING FLOWS                      215                     1
CRITICAL GAPS                          5.0                   5.0
CAPACITY                               968                  1199
CAPACITY USED                           16%                    0%
IMPEDANCE FACTOR                      0.89                  1.00
ACTUAL CAPACITY                        968                  1199
```

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1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:01-06-1989             TIME:15:46:42
LINCOLN/KBE GARAGE - ALTERNATIVE 1 CONDITIONS - 2-WAY ESSEX: PM PEAK HOUR

STEP 2 LEFT TURNS FROM     B:LINCOLN SB              A:LINCOLN NB
CONFLICTING FLOWS                       430                    1
CRITICAL GAPS                           4.5                  4.5
CAPACITY                                880                 1308
CAPACITY USED                            0%                   0%
IMPEDANCE FACTOR                       1.00                 1.00
ACTUAL CAPACITY                         880                 1308


STEP 3 THRU MOVES FROM     C:125 SUMMER              D:KBE GARAGE
CONFLICTING FLOWS                       432                  431
CRITICAL GAPS                           5.5                  5.5
CAPACITY                                679                  679
CAPACITY USED                            0%                   0%
IMPEDANCE FACTOR                       1.00                 1.00
ACTUAL CAPACITY                         679                  679


STEP 4 LEFT TURNS FROM     C:125 SUMMER              D:KBE GARAGE
CONFLICTING FLOWS                       432                  589
CRITICAL GAPS                           6.0                  6.0
CAPACITY                                602                  489
ACTUAL CAPACITY                         602                  435


                    SUMMARY OF LEVEL OF SERVICE BY MOVEMENT
MOVEMENT               DEMAND    CAPACITY  RESERVE   LOS  AVG DEL(SEC) AVG QUEUE


ALL MOVES FROM C:         158        968       810     A       4.44         0.19

ALL MOVES FROM D:          32        435       403     A       8.93         0.08
```

APPENDIX B-4

MBTA CORRESPONDENCE REGARDING TRANSIT CAPACITY

**MASSACHUSETTS
BAY
TRANSPORTATION
AUTHORITY**

Ten Park Plaza, Boston, MA 02116

December 2, 1988

Ms. Jane Howard
Howard/Stein - Hudson Associates
38 Chauncy Street, 7th Floor
Boston, MA 02111

Dear Ms. Howard:

In accordance with our recent telephone conversation, the following descriptions are provided of current and planned (near-term) expansion of Red and Orange Line services.

RED LINE

Current Red Line service has 29 trains scheduled for service, as summarized below:

	4-CAR TRAINS	6-CAR TRAINS	TOTAL TRAINS	AVERAGE HEADWAY
Braintree-Alewife	5	9	14	8 min.
Ashmont-Alewife	7	5	12	8 min.
Run-as-Directed	-	3	3	
	12	17	29	

The three run-as-directed trains are used by Transportation Officials to provide extra service where needed. Generally, each of these trains make one trip in each direction during the peak hour. The 29 trains make one trip in each direction during the peak. The following estimate of peak period ridership on the Red Line was developed from observations of passenger loads at peak load points.

		PEAK PERIOD		PEAK HOUR
RED LINE				
Between Andrew and JFK	ASHMT	9,000 (4-6PM)	ASHMT	5,400 (5:45-5:45PM)
Between Andrew and No. Quincy	BRNTR	12,250 (4-6PM)	BRNTR	7,350 (4:30-5:30PM)
		21,250		12,750

The MBTA is currently accepting cars from an order of fifty-eight (58) new cars for the Red Line. To date forty-two (42) cars have been delivered with the remainder due in by early 1989. These new cars will increase the Red Line fleet size to 218 cars, broken down as follows:

86	No. 5 Cambridge-Dorchester
74	No. 1 South Shore
58	No. 2
218	

The MBTA intends to minimize the use of the older, problematic No. 5 Cambridge-Dorchester cars as six-car train units. Delivery of the 58 new No. 2 cars will permit for the 17 six-car trains in the 150 car schedule to be made up exclusively of the new No. 2 cars and the recently rebuilt No. 1 South Shore cars. The No. 5 cars will continue to run in service as four-car trains. Accordingly, it is appropriate that the currently scheduled service should be assumed for the early 1990´s.

The MBTA is currently preparing a specification for the No. 3 car which will replace the No. 5 car and possibly further supplement the Red Line fleet. Recognizing that car procurements normally require three to five years, it seems appropriate that no No. 3 cars should be assumed for the early 1990´s.

The planning standard for passenger capacity of a Red Line car is 180 passengers based on a fully seated load and 2.5 square feet of available standee space per standee.

ORANGE LINE

Current Orange Line service has eighteen (18) trains scheduled for service, as summarized below:

	4-CAR TRAINS	6-CAR TRAINS	TOTAL TRAINS	AVERAGE HEADWAY
Forest Hills - Oak Grove	4	~~15~~ 14	18	4 1/2 min.

All Orange Line trains operate between line terminals. The following estimate of peak period ridership on the Orange Line was developed from observations of passenger loads at peak load points.

	PEAK PERIOD	PEAK HOUR
ORANGE LINE NORTH		
Between Haymarket and North Station	15700 (7-9AM)	9300 (8:00-9:00AM)
	15000 (4-6PM)	8900 (4:45-5:45PM)
ORANGE LINE - SWC		
Between Back Bay and NEMC	14600 (7-9AM)	8800 (7:45-8:45AM)
	12600 (4-6PM)	7650 (4:45-5:45PM)

The Orange Line fleet has 120 Hawker-Siddeley vehicles purchased in 1980. A specification for additional Orange Line cars is being prepared, however, it is expected that delivery would occur after the No. 3 Red Line car procurement. The 102 vehicles required to provide the current schedule is the maximum practical number of vehicles that can be scheduled for service. Accordingly, it is appropriate to assume the current schedule through the early 1990's.

The planning standard for passenger capacity of an Orange Line car is 155 passengers based on a fully seated load and 2.5 square feet of available standee space per standee.

I hope that this information will be helpful.

Very truly yours,

Michael T. Burns

Michael T. Burns
Manger of Operations Planning

MTB/lmr

APPENDIX B-5

PERSON TRIP RATES AND MODAL SPLIT CALCULATIONS FOR DEVELOPMENT OPTION

- 400 Ft. Tower
- 325 Ft. Tower
- 250 Ft. Tower
- Expanded Site
- Developer's Proposal

TRIP GENERATION SUMMARY BY ALTERNATIVE
FOR KINGSTON/BEDFORD GARAGE DEIR
DATE OF UPDATE:OCTOBER 3, 1988

PERSON TRIP RATES:			ALTERNATIVE: USES:		K-B-E BUILD ALTERNATIVE: 400' TOWER TRIPS BY USE:				
	OFFICE	RETAIL	HOTEL	OTHER	OFFICE	RETAIL	HOTEL	OTHER	TOTAL
Unit	000 sf	000 sf	rooms	000 sf	679.00	22.00	300	7.00	
TOTAL ADT:									
Work	7.29	6.82	2.58		4950	150	774	0	5874
Non-Work	3.93	50.03	14.63		2668	1101	4389	0	8158
Total	11.22	56.85	17.21		7618	1251	5163	0	14032
AM PEAK									
In									
Work	1.41	0.51	0.09		957	11	27	0	995
Non-Work	0.35	0.33	0.78		238	7	234	0	479
Total In:	1.76	0.84	0.87		1195	18	261	0	1474
Out									
Work	0.00	0.00	0.00		0	0	0	0	0
Non-work	0.26	0.35	0.45		177	8	135	0	320
Total Out:	0.26	0.35	0.45		177	8	135	0	320
Total									
Work	1.41	0.51	0.09		957	11	27	0	995
Non-work	0.61	0.68	1.23		414	15	369	0	798
Total	2.02	1.19	1.32		1372	26	396	0	1794
PM PEAK									
In									
Work	0.11	0.47	0.00		75	10	0	0	85
Non-work	0.20	1.89	0.70		136	42	210	0	388
Total In	0.31	2.36	0.70		210	52	210	0	472
Out									
Work	1.34	0.53	0.05		910	12	15	0	937
Non-work	0.24	2.13	0.54		163	47	162	0	372
Total Out	1.58	2.66	0.59		1073	59	177	0	1309
Total									
Work	1.45	1.00	0.05		985	22	15	0	1022
Non-work	0.44	4.02	1.24		299	88	372	0	759
Total	1.89	5.02	1.29		1283	110	387	0	1780
SATURDAY TOTAL									
Work	2.10	8.44	1.94		1426	186	582	0	2194
Non-Work	0.23	61.93	11.03		156	1362	3309	0	4827
Total	2.33	70.37	12.97		1582	1548	3891	0	7021
SATURDAY PEAK									
In									
Work	0.10	0.17	0.00		68	4	0	0	72
Non-work	0.01	3.16	0.57		7	70	171	0	248
Total In	0.11	3.33	0.57		75	73	171	0	319
Out									
Work	0.09	0.16	0.04		61	4	12	0	77
Non-work	0.01	3.04	0.41		7	67	123	0	197
Total Out	0.10	3.20	0.45		68	70	135	0	273
Total									
Work	0.19	0.33	0.04		129	7	12	0	148
Non-work	0.02	6.20	0.98		14	136	294	0	444
Total	0.21	6.53	1.02		143	144	306	0	593

MODE SPLIT SUMMARY BY ALTERNATIVE
FOR KINGSTON/BEDFORD DEIR
DATE OF UPDATE: OCTOBER 17, 1988
ALTERNATIVE: K-B-E: 400'FOOT TOWER

OFFICE:

		MODE SPLIT				
		AUTO		TRANSIT	WALK/ OTHER	
	TOTAL	Persons	Cars			Check
TOTAL ADT:						
Work	4950	1485	825	2970	495	4950
Non-Work	2668	734	524	1267	667	2668
Total	7618	2219	1349	4237	1162	7618
AM PEAK						
In						
Work	957	287	159	574	96	957
Non-Work	238	65	47	113	60	238
Total In:	1195	353	206	687	155	1195
Out						
Work	0	0	0	0	0	0
Non-work	177	49	35	84	44	177
Total Out:	177	49	35	84	44	177
Total						
Work	957	287	159	574	96	957
Non-work	415	114	82	197	104	415
Total	1372	401	241	771	199	1372
PM PEAK						
In						
Work	75	23	13	45	8	75
Non-work	136	37	27	65	34	136
Total In	211	60	39	110	42	211
Out						
Work	910	273	152	546	91	910
Non-work	163	45	32	77	41	163
Total Out	1073	318	184	623	132	1073
Total						
Work	985	296	164	591	99	985
Non-work	299	82	59	142	75	299
Total	1284	378	223	733	173	1284
SATURDAY TOTAL						
Work	1426	428	238	856	143	1426
Non-Work	156	43	31	74	39	156
Total	1582	471	268	930	182	1582
SATURDAY PEAK						
In						
Work	68	20	11	41	7	68
Non-work	7	2	1	3	2	7
Total In	75	22	13	44	9	75
Out						
Work	61	18	10	37	6	61
Non-work	7	2	1	3	2	7
Total Out	68	20	12	40	8	68
Total						
Work	129	39	21	77	13	129
Non-work	14	4	3	7	4	14
Total	143	43	24	84	16	143

RETAIL:

		MODE SPLIT				
		AUTO		TRANSIT	WALK/ OTHER	
	TOTAL	Persons	Cars			Check
TOTAL ADT:						
Work	150	45	32	90	15	150
Non-Work	1101	303	159	358	440	1101
Total	1251	348	191	448	455	1251
AM PEAK						
In						
Work	11	3	2	7	1	11
Non-Work	7	2	1	2	3	7
Total In:	18	5	3	9	4	18
Out						
Work	0	0	0	0	0	0
Non-work	8	2	1	3	3	8
Total Out:	8	2	1	3	3	8
Total						
Work	11	3	2	7	1	11
Non-work	15	4	2	5	6	15
Total	26	7	5	11	7	26
PM PEAK						
In						
Work	10	3	2	6	1	10
Non-work	42	12	6	14	17	42
Total In	52	15	8	20	18	52
Out						
Work	12	4	3	7	1	12
Non-work	47	13	7	15	19	47
Total Out	59	17	9	22	20	59
Total						
Work	22	7	5	13	2	22
Non-work	89	24	13	29	36	89
Total	111	31	18	42	38	111
SATURDAY TOTAL						
Work	186	56	40	112	19	186
Non-Work	1362	375	197	443	545	1362
Total	1548	430	237	554	563	1548
SATURDAY PEAK						
In						
Work	4	1	1	2	0	4
Non-work	70	19	10	23	28	70
Total In	74	20	11	25	28	74
Out						
Work	4	1	1	2	0	4
Non-work	67	18	10	22	27	67
Total Out	71	20	11	24	27	71
Total						
Work	8	2	2	5	1	8
Non-work	137	38	20	45	55	137
Total	145	40	22	49	56	145

HOTEL

		MODE SPLIT				
		AUTO		TRANSIT	WALK/ OTHER	
	TOTAL	Persons	Cars			Check
TOTAL ADT:						
Work	774	232	166	464	77	774
Non-Work	4389	2414	1271	878	1097	4389
Total	5163	2646	1436	1342	1175	5163
AM PEAK						
In						
Work	27	8	6	16	3	27
Non-Work	234	129	68	47	59	234
Total In:	261	137	74	63	61	261
Out						
Work	0	0	0	0	0	0
Non-work	135	74	39	27	34	135
Total Out:	135	74	39	27	34	135
Total						
Work	27	8	6	16	3	27
Non-work	369	203	107	74	92	369
Total	396	211	113	90	95	396
PM PEAK						
In						
Work	0	0	0	0	0	0
Non-work	210	116	61	42	53	210
Total In	210	116	61	42	53	210
Out						
Work	15	5	3	9	2	15
Non-work	162	89	47	32	41	162
Total Out	177	94	50	41	42	177
Total						
Work	15	5	3	9	2	15
Non-work	372	205	108	74	93	372
Total	387	209	111	83	95	387
SATURDAY TOTAL						
Work	582	175	125	349	58	582
Non-Work	3309	1820	958	662	827	3309
Total	3891	1995	1083	1011	885	3891
SATURDAY PEAK						
In						
Work	0	0	0	0	0	0
Non-work	171	94	50	34	43	171
Total In	171	94	50	34	43	171
Out						
Work	12	4	3	7	1	12
Non-work	123	68	36	25	31	123
Total Out	135	71	38	32	32	135
Total						
Work	12	4	3	7	1	12
Non-work	294	162	85	59	74	294
Total	306	165	88	66	75	306

TOTAL

		MODE SPLIT			WALK/	
		AUTO		TRANSIT	OTHER	
	TOTAL	Persons	Cars			Check
TOTAL ADT:						
Work	5874	1762	1023	3524	587	5874
Non-Work	8158	3450	1954	2503	2205	8158
Total	14032	5213	2977	6027	2792	14032
AM PEAK						
In						
Work	995	299	168	597	100	995
Non-Work	479	196	116	162	121	479
Total In:	1474	495	283	759	220	1474
Out						
Work	0	0	0	0	0	0
Non-work	320	125	75	114	81	320
Total Out:	320	125	75	114	81	320
Total						
Work	995	299	168	597	100	995
Non-work	799	321	191	276	202	799
Total	1794	620	358	873	302	1794
PM PEAK						
In						
Work	85	26	15	51	9	85
Non-work	388	164	94	120	103	388
Total In	473	190	108	171	112	473
Out						
Work	937	281	157	562	94	937
Non-work	372	147	86	125	100	372
Total Out	1309	428	243	687	194	1309
Total						
Work	1022	307	172	613	102	1022
Non-work	760	311	179	245	203	760
Total	1782	618	351	859	306	1782
SATURDAY TOTAL						
Work	2194	658	402	1316	219	2194
Non-Work	4827	2237	1186	1179	1411	4827
Total	7021	2896	1588	2495	1630	7021
SATURDAY PEAK						
In						
Work	72	22	12	43	7	72
Non-work	248	115	61	60	73	248
Total In	320	137	73	103	80	320
Out						
Work	77	23	14	46	8	77
Non-work	197	88	47	50	59	197
Total Out	274	111	60	96	67	274
Total						
Work	149	45	26	89	15	149
Non-work	445	203	108	110	132	445
Total	594	248	133	199	147	594

TRIP GENERATION SUMMARY BY ALTERNATIVE
FOR KINGSTON/BEDFORD GARAGE DEIR
DATE OF UPDATE:OCTOBER 3, 1988

ALTERNATIVE: K-B-E BUILD ALTERNATIVE: 325' TOWER

PERSON TRIP RATES:			USES:			TRIPS BY USE:			
	OFFICE	RETAIL	HOTEL	OTHER	OFFICE	RETAIL	HOTEL	OTHER	TOTAL
Unit	000 sf	000 sf	rooms	000 sf	554.00	26.00	240	7.00	
TOTAL ADT:									
Work	7.67	6.82	2.57		4249	177	617	0	5043
Non-Work	4.13	50.03	14.54		2288	1301	3490	0	7079
Total	11.80	56.85	17.11		6537	1478	4106	0	12121
AM PEAK									
In									
Work	1.45	0.51	0.08		803	13	19	0	835
Non-Work	0.36	0.33	0.68		199	9	163	0	371
Total In:	1.81	0.84	0.76		1003	22	182	0	1207
Out									
Work	0.00	0.00	0.00		0	0	0	0	0
Non-work	0.27	0.35	0.39		150	9	94	0	253
Total Out:	0.27	0.35	0.39		150	9	94	0	253
Total									
Work	1.45	0.51	0.08		803	13	19	0	835
Non-work	0.63	0.68	1.07		349	18	257	0	624
Total	2.08	1.19	1.15		1152	31	276	0	1459
PM PEAK									
In									
Work	0.11	0.47	0.00		61	12	0	0	73
Non-work	0.20	1.89	0.65		111	49	0	0	160
Total In	0.31	2.36	0.65		172	61	156	0	389
Out									
Work	1.39	0.53	0.04		770	14	10	0	794
Non-work	0.24	2.13	0.51		133	55	122	0	310
Total Out	1.63	2.66	0.55		903	69	132	0	1104
Total									
Work	1.50	1.00	0.04		831	26	10	0	867
Non-work	0.45	4.02	1.16		249	105	278	0	632
Total	1.95	5.02	1.20		1080	131	288	0	1499
SATURDAY TOTAL									
Work	2.14	8.44	2.02		1186	219	485	0	1890
Non-Work	0.24	61.93	11.45		133	1610	2748	0	4491
Total	2.38	70.37	13.47		1319	1830	3233	0	6382
SATURDAY PEAK									
In									
Work	0.11	0.17	0.00		61	4	0	0	65
Non-work	0.01	3.16	0.64		6	82	154	0	242
Total In	0.12	3.33	0.64		66	87	154	0	307
Out									
Work	0.10	0.16	0.04		55	4	10	0	69
Non-work	0.01	3.04	0.46		6	79	110	0	195
Total Out	0.11	3.20	0.50		61	83	120	0	264
Total									
Work	0.21	0.33	0.04		116	9	10	0	135
Non-work	0.02	6.20	1.10		11	161	264	0	436
Total	0.23	6.53	1.14		127	170	274	0	571

MODE SPLIT SUMMARY BY ALTERNATIVE
FOR KINGSTON/BEDFORD DEIR
DATE OF UPDATE: OCTOBER 17, 1988
ALTERNATIVE: K-B-E 325'TOWER

OFFICE:

		MODE SPLIT				
		AUTO		TRANSIT	WALK/ OTHER	
	TOTAL	Persons	Cars			Check
TOTAL ADT:						
Work	4249	1275	708	2549	425	4249
Non-Work	2288	629	449	1087	572	2288
Total	6537	1904	1158	3636	997	6537
AM PEAK						
In						
Work	803	241	134	482	80	803
Non-Work	199	55	39	95	50	199
Total In:	1002	296	173	576	130	1002
Out						
Work	0	0	0	0	0	0
Non-work	150	41	29	71	38	150
Total Out:	150	41	29	71	38	150
Total						
Work	803	241	134	482	80	803
Non-work	349	96	69	166	87	349
Total	1152	337	202	648	168	1152
PM PEAK						
In						
Work	61	18	10	37	6	61
Non-work	111	31	22	53	28	111
Total In	172	49	32	89	34	172
Out						
Work	770	231	128	462	77	770
Non-work	133	37	26	63	33	133
Total Out	903	268	154	525	110	903
Total						
Work	831	249	139	499	83	831
Non-work	244	67	48	116	61	244
Total	1075	316	186	615	144	1075
SATURDAY TOTAL						
Work	1186	356	198	712	119	1186
Non-Work	133	37	26	63	33	133
Total	1319	392	224	775	152	1319
SATURDAY PEAK						
In						
Work	61	18	10	37	6	61
Non-work	6	2	1	3	2	6
Total In	67	20	11	39	8	67
Out						
Work	55	17	9	33	6	55
Non-work	6	2	1	3	2	6
Total Out	61	18	10	36	7	61
Total						
Work	116	35	19	70	12	116
Non-work	12	3	2	6	3	12
Total	128	38	22	75	15	128

RETAIL:

		MODE SPLIT			WALK/	
		AUTO		TRANSIT	OTHER	
	TOTAL	Persons	Cars			Check
TOTAL ADT:						
Work	177	53	38	106	18	177
Non-Work	1301	358	188	423	520	1301
Total	1478	411	226	529	538	1478
AM PEAK						
In						
Work	13	4	3	8	1	13
Non-Work	9	2	1	3	4	9
Total In:	22	6	4	11	5	22
Out						
Work	0	0	0	0	0	0
Non-work	9	2	1	3	4	9
Total Out:	9	2	1	3	4	9
Total						
Work	13	4	3	8	1	13
Non-work	18	5	3	6	7	18
Total	31	9	5	14	9	31
PM PEAK						
In						
Work	12	4	3	7	1	12
Non-work	49	13	7	16	20	49
Total In	61	17	10	23	21	61
Out						
Work	14	4	3	8	1	14
Non-work	55	15	8	18	22	55
Total Out	69	19	11	26	23	69
Total						
Work	26	8	6	16	3	26
Non-work	104	29	15	34	42	104
Total	130	36	21	49	44	130
SATURDAY TOTAL						
Work	219	66	47	131	22	219
Non-Work	1610	443	233	523	644	1610
Total	1829	508	280	655	666	1829
SATURDAY PEAK						
In						
Work	4	1	1	2	0	4
Non-work	82	23	12	27	33	82
Total In	86	24	13	29	33	86
Out						
Work	4	1	1	2	0	4
Non-work	79	22	11	26	32	79
Total Out	83	23	12	28	32	83
Total						
Work	8	2	2	5	1	8
Non-work	161	44	23	52	64	161
Total	169	47	25	57	65	169

HOTEL

		MODE SPLIT			WALK/	
		AUTO		TRANSIT	OTHER	
	TOTAL	Persons	Cars			Check
TOTAL ADT:						
Work	617	185	132	370	62	617
Non-Work	3490	1920	1010	698	873	3490
Total	4107	2105	1142	1068	934	4107
AM PEAK						
In						
Work	19	6	4	11	2	19
Non-Work	163	90	47	33	41	163
Total In:	182	95	51	44	43	182
Out						
Work	0	0	0	0	0	0
Non-work	94	52	27	19	24	94
Total Out:	94	52	27	19	24	94
Total						
Work	19	6	4	11	2	19
Non-work	257	141	74	51	64	257
Total	276	147	78	63	66	276
PM PEAK						
In						
Work	0	0	0	0	0	0
Non-work	156	86	45	31	39	156
Total In	156	86	45	31	39	156
Out						
Work	10	3	2	6	1	10
Non-work	122	67	35	24	31	122
Total Out	132	70	37	30	32	132
Total						
Work	10	3	2	6	1	10
Non-work	278	153	80	56	70	278
Total	288	156	83	62	71	288
SATURDAY TOTAL						
Work	485	146	104	291	49	485
Non-Work	2748	1511	795	550	687	2748
Total	3233	1657	899	841	736	3233
SATURDAY PEAK						
In						
Work	0	0	0	0	0	0
Non-work	154	85	45	31	39	154
Total In	154	85	45	31	39	154
Out						
Work	10	3	2	6	1	10
Non-work	110	61	32	22	28	110
Total Out	120	64	34	28	29	120
Total						
Work	10	3	2	6	1	10
Non-work	264	145		53	66	264
Total	274	148	2	59	67	274

TOTAL

		MODE SPLIT				
		AUTO		TRANSIT	WALK/ OTHER	
	TOTAL	Persons	Cars			Check
TOTAL ADT:						
Work	5043	1513	878	3026	504	5043
Non-Work	7079	2906	1648	2208	1965	7079
Total	12122	4419	2526	5233	2469	12122
AM PEAK						
In						
Work	835	250	141	501	84	835
Non-Work	371	147	88	130	94	371
Total In:	1206	397	228	631	178	1206
Out						
Work	0	0	0	0	0	0
Non-work	253	95	58	93	65	253
Total Out:	253	95	58	93	65	253
Total						
Work	835	250	141	501	84	835
Non-work	624	242	146	223	159	624
Total	1459	493	286	724	242	1459
PM PEAK						
In						
Work	73	22	13	44	7	73
Non-work	316	130	74	100	86	316
Total In	389	152	87	144	94	389
Out						
Work	794	238	133	476	79	794
Non-work	310	119	69	105	86	310
Total Out	1104	357	203	582	165	1104
Total						
Work	867	260	146	520	87	867
Non-work	626	249	143	205	172	626
Total	1493	509	290	726	259	1493
SATURDAY TOTAL						
Work	1890	567	349	1134	189	1890
Non-Work	4491	1991	1055	1136	1364	4491
Total	6381	2558	1403	2270	1553	6381
SATURDAY PEAK						
In						
Work	65	20	11	39	7	65
Non-work	242	109	58	60	73	242
Total In	307	128	69	99	79	307
Out						
Work	69	21	12	41	7	69
Non-work	195	84	44	51	61	195
Total Out	264	105	57	92	68	264
Total						
Work	134	40	23	80	13	134
Non-work	437	193	102	111	133	437
Total	571	233	125	191	147	571

TRIP GENERATION SUMMARY BY ALTERNATIVE
FOR KINGSTON/BEDFORD GARAGE DEIR
DATE OF UPDATE:OCTOBER 3, 1988

PERSON TRIP RATES:			ALTERNATIVE: USES:		K-B-E BUILD ALTERNATIVE: 250' TOWER TRIPS BY USE:				
	OFFICE	RETAIL	HOTEL	OTHER	OFFICE	RETAIL	HOTEL	OTHER	TOTAL
Unit	000 sf	000 sf	rooms	000 sf	429.00	26.00	200	7.00	
TOTAL ADT:									
Work	8.18	6.82	2.55		3509	177	510	0	4196
Non-Work	4.40	50.03	14.46		1888	1301	2892	0	6081
Total	12.58	56.85	17.01		5397	1478	3402	0	10277
AM PEAK									
In									
Work	1.50	0.51	0.07		644	13	14	0	671
Non-Work	0.38	0.33	0.61		163	9	122	0	294
Total In:	1.88	0.84	0.68		807	22	136	0	965
Out									
Work	0.00	0.00	0.00		0	0	0	0	0
Non-work	0.28	0.35	0.35		120	9	70	0	199
Total Out:	0.28	0.35	0.35		120	9	70	0	199
Total									
Work	1.50	0.51	0.07		644	13	14	0	671
Non-work	0.66	0.68	0.96		283	18	192	0	493
Total	2.16	1.19	1.03		927	31	206	0	1164
PM PEAK									
In									
Work	0.11	0.47	0.00		47	12	0	0	59
Non-work	0.21	1.89	0.62		90	49	124	0	263
Total In	0.32	2.36	0.62		137	61	124	0	322
Out									
Work	1.45	0.53	0.04		622	14	8	0	644
Non-work	0.26	2.13	0.48		112	55	96	0	263
Total Out	1.71	2.66	0.52		734	69	104	0	907
Total									
Work	1.56	1.00	0.04		669	26	8	0	703
Non-work	0.47	4.02	1.10		202	105	220	0	527
Total	2.03	5.02	1.14		871	131	228	0	1230
SATURDAY TOTAL									
Work	2.19	8.44	2.10		940	219	420	0	1579
Non-Work	0.24	61.93	11.88		103	1610	2376	0	4089
Total	2.43	70.37	13.98		1042	1830	2796	0	5668
SATURDAY PEAK									
In									
Work	0.12	0.17	0.00		51	4	0	0	55
Non-work	0.01	3.16	0.71		4	82	142	0	228
Total In	0.13	3.33	0.71		56	87	142	0	285
Out									
Work	0.12	0.16	0.04		51	4	8	0	63
Non-work	0.01	3.04	0.51		4	79	102	0	185
Total Out	0.13	3.20	0.55		56	83	110	0	249
Total									
Work	0.24	0.33	0.04		103	9	8	0	120
Non-work	0.02	6.20	1.22		9	161	244	0	414
Total	0.26	6.53	1.26		112	170	252	0	534

MODE SPLIT SUMMARY BY ALTERNATIVE
FOR KINGSTON/BEDFORD DEIR
DATE OF UPDATE: OCTOBER 17, 1988
ALTERNATIVE: K-B-E 250' TOWER

OFFICE:

		MODE SPLIT				
		AUTO		TRANSIT	WALK/ OTHER	
	TOTAL	Persons	Cars			Check
TOTAL ADT:						
Work	3509	1053	585	2105	351	3509
Non-Work	1888	519	371	897	472	1888
Total	5397	1572	956	3002	823	5397
AM PEAK						
In						
Work	644	193	107	386	64	644
Non-Work	163	45	32	77	41	163
Total In:	807	238	139	464	105	807
Out						
Work	0	0	0	0	0	0
Non-work	120	33	24	57	30	120
Total Out:	120	33	24	57	30	120
Total						
Work	644	193	107	386	64	644
Non-work	283	78	56	134	71	283
Total	927	271	163	521	135	927
PM PEAK						
In						
Work	47	14	8	28	5	47
Non-work	90	25	18	43	23	90
Total In	137	39	26	71	27	137
Out						
Work	622	187	104	373	62	622
Non-work	112	31	22	53	28	112
Total Out	734	217	126	426	90	734
Total						
Work	669	201	111	401	67	669
Non-work	202	56	40	96	51	202
Total	871	256	151	497	117	871
SATURDAY TOTAL						
Work	940	282	157	564	94	940
Non-Work	103	28	20	49	26	103
Total	1043	310	177	613	120	1043
SATURDAY PEAK						
In						
Work	51	15	9	31	5	51
Non-work	4	1	1	2	1	4
Total In	55	16	9	33	6	55
Out						
Work	51	15	9	31	5	51
Non-work	4	1	1	2	1	4
Total Out	55	16	9	33	6	55
Total						
Work	102	31	17	61	10	102
Non-work	8	2	2	4	2	8
Total	110	33	19	65	12	110

RETAIL:

		MODE SPLIT				
		AUTO		TRANSIT	WALK/ OTHER	
	TOTAL	Persons	Cars			Check
TOTAL ADT:						
Work	177	53	38	106	18	177
Non-Work	1301	358	188	423	520	1301
Total	1478	411	226	529	538	1478
AM PEAK						
In						
Work	13	4	3	8	1	13
Non-Work	9	2	1	3	4	9
Total In:	22	6	4	11	5	22
Out						
Work	0	0	0	0	0	0
Non-work	9	2	1	3	4	9
Total Out:	9	2	1	3	4	9
Total						
Work	13	4	3	8	1	13
Non-work	18	5	3	6	7	18
Total	31	9	5	14	9	31
PM PEAK						
In						
Work	12	4	3	7	1	12
Non-work	49	13	7	16	20	49
Total In	61	17	10	23	21	61
Out						
Work	14	4	3	8	1	14
Non-work	55	15	8	18	22	55
Total Out	69	19	11	26	23	69
Total						
Work	26	8	6	16	3	26
Non-work	104	29	15	34	42	104
Total	130	36	21	49	44	130
SATURDAY TOTAL						
Work	219	66	47	131	22	219
Non-Work	1610	443	233	523	644	1610
Total	1829	508	280	655	666	1829
SATURDAY PEAK						
In						
Work	4	1	1	2	0	4
Non-work	82	23	12	27	33	82
Total In	86	24	13	29	33	86
Out						
Work	4	1	1	2	0	4
Non-work	79	22	11	26	32	79
Total Out	83	23	12	28	32	83
Total						
Work	8	2	2	5	1	8
Non-work	161	44	23	52	64	161
Total	169	47	25	57	65	169

HOTEL

		MODE SPLIT			WALK/	
		AUTO		TRANSIT	OTHER	
	TOTAL	Persons	Cars			Check
TOTAL ADT:						
Work	510	153	109	306	51	510
Non-Work	2892	1591	837	578	723	2892
Total	3402	1744	946	884	774	3402
AM PEAK						
In						
Work	14	4	3	8	1	14
Non-Work	122	67	35	24	31	122
Total In:	136	71	38	33	32	136
Out						
Work	0	0	0	0	0	0
Non-work	70	39	20	14	18	70
Total Out:	70	39	20	14	18	70
Total						
Work	14	4	3	8	1	14
Non-work	192	106	56	38	48	192
Total	206	110	59	47	49	206
PM PEAK						
In						
Work	0	0	0	0	0	0
Non-work	124	68	36	25	31	124
Total In	124	68	36	25	31	124
Out						
Work	8	2	2	5	1	8
Non-work	96	53	28	19	24	96
Total Out	104	55	30	24	25	104
Total						
Work	8	2	2	5	1	8
Non-work	220	121	64	44	55	220
Total	228	123	65	49	56	228
SATURDAY TOTAL						
Work	420	126	90	252	42	420
Non-Work	2376	1307	688	475	594	2376
Total	2796	1433	778	727	636	2796
SATURDAY PEAK						
In						
Work	0	0	0	0	0	0
Non-work	142	78	41	28	36	142
Total In	142	78	41	28	36	142
Out						
Work	8	2	2	5	1	8
Non-work	102	56	30	20	26	102
Total Out	110	59	31	25	26	110
Total						
Work	8	2	2	5	1	8
Non-work	244	134		49	61	244
Total	252	137	2	54	62	252

TOTAL

		MODE SPLIT			WALK/	
		AUTO		TRANSIT	OTHER	
	TOTAL	Persons	Cars			Check
TOTAL ADT:						
Work	4196	1259	732	2518	420	4196
Non-Work	6081	2468	1396	1898	1715	6081
Total	10277	3726	2128	4416	2135	
AM PEAK						
In						
Work	671	201	113	403	67	671
Non-Work	294	114	69	105	75	294
Total In:	965	316	182	507	142	136
Out						
Work	0	0	0	0	0	0
Non-work	199	74	45	74	51	199
Total Out:	199	74	45	74	51	199
Total						
Work	671	201	113	403	67	671
Non-work	192	188	114	179	126	192
Total	206	110	59	47	49	206
PM PEAK						
In						
Work	59	18	10	35	6	59
Non-work	263	106	61	83	73	263
Total In	322	124	71	119	79	322
Out						
Work	644	193	108	386	64	644
Non-work	263	99	58	90	74	263
Total Out	907	292	166	477	138	907
Total						
Work	703	211	119	422	70	703
Non-work	526	205	118	174	147	526
Total	1229	416	237	596	217	1229
SATURDAY TOTAL						
Work	1579	474	294	947	158	1579
Non-Work	4089	1778	941	1047	1264	4089
Total	5668	2252	1235	1995	1422	5668
SATURDAY PEAK						
In						
Work	55	17	9	33	6	55
Non-work	228	102	54	57	69	228
Total In	283	118	63	90	75	283
Out						
Work	63	19	11	38	6	63
Non-work	185	79	42	48	58	185
Total Out	248	98	53	86	64	248
Total						
Work	118	35	20	71	12	118
Non-work	413	181	96	105	127	413
Total	531	216	116	176	139	531

TRIP GENERATION SUMMARY BY ALTERNATIVE
FOR KINGSTON/BEDFORD GARAGE DEIR
DATE OF UPDATE:OCTOBER 3, 1988

ALTERNATIVE: K-B-E- BUILD ALTERNATIVE: EXPANDED SITE

PERSON TRIP RATES:			USES:			TRIPS BY USE:			
	OFFICE	RETAIL	HOTEL	OTHER	OFFICE	RETAIL	HOTEL	OTHER	TOTAL
Unit	000 sf	000 sf	rooms	000 sf	510.00	30.00	300	7.00	
TOTAL ADT:									
Work	7.83	6.82	2.58		3993	205	774	0	4972
Non-Work	4.22	50.03	14.63		2152	1501	4389	0	8042
Total	12.05	56.85	17.21		6146	1706	5163	0	13015
AM PEAK									
In									
Work	1.47	0.51	0.09		750	15	27	0	792
Non-Work	0.37	0.33	0.78		189	10	234	0	433
Total In:	1.84	0.84	0.87		938	25	261	0	1224
Out									
Work	0.00	0.00	0.00		0	0	0	0	0
Non-work	0.27	0.35	0.45		138	11	135	0	284
Total Out:	0.27	0.35	0.45		138	11	135	0	284
Total									
Work	1.47	0.51	0.09		750	15	27	0	792
Non-work	0.64	0.68	1.23		326	20	369	0	715
Total	2.11	1.19	1.32		1076	36	396	0	1508
PM PEAK									
In									
Work	0.11	0.47	0.00		56	14	0	0	70
Non-work	0.20	1.89	0.70		102	57	210	0	369
Total In	0.31	2.36	0.70		158	71	210	0	439
Out									
Work	1.41	0.53	0.05		719	16	15	0	750
Non-work	0.25	2.13	0.54		128	64	162	0	354
Total Out	1.66	2.66	0.59		847	80	177	0	1104
Total									
Work	1.52	1.00	0.05		775	30	15	0	820
Non-work	0.45	4.02	1.24		230	121	372	0	723
Total	1.97	5.02	1.29		1005	151	387	0	1543
SATURDAY TOTAL									
Work	2.16	8.44	1.94		1102	253	582	0	1937
Non-Work	0.24	61.93	11.03		122	1858	3309	0	5289
Total	2.40	70.37	12.97		1224	2111	3891	0	7226
SATURDAY PEAK									
In									
Work	0.12	0.17	0.00		61	5	0	0	66
Non-work	0.01	3.16	0.57		5	95	171	0	271
Total In	0.13	3.33	0.57		66	100	171	0	337
Out									
Work	0.10	0.16	0.04		51	5	12	0	68
Non-work	0.01	3.04	0.41		5	91	123	0	219
Total Out	0.11	3.20	0.45		56	96	135	0	287
Total									
Work	0.22	0.33	0.04		112	10	12	0	134
Non-work	0.02	6.20	0.98		10	186	294	0	490
Total	0.24	6.53	1.02		122	196	306	0	624

MODE SPLIT SUMMARY BY ALTERNATIVE
FOR KINGSTON/BEDFORD DEIR
DATE OF UPDATE: OCTOBER 17, 1988
ALTERNATIVE: K-B-E EXPANDED SITE

OFFICE:

		AUTO	MODE SPLIT	TRANSIT	WALK/ OTHER	
	TOTAL	Persons	Cars			Check
TOTAL ADT:						
Work	3993	1198	665	2396	399	3993
Non-Work	2152	592	423	1022	538	2152
Total	6145	1790	1088	3418	937	6145
AM PEAK						
In						
Work	750	225	125	450	75	750
Non-Work	189	52	37	90	47	189
Total In:	939	277	162	540	122	939
Out						
Work	0	0	0	0	0	0
Non-work	138	38	27	66	35	138
Total Out:	138	38	27	66	35	138
Total						
Work	750	225	125	450	75	750
Non-work	327	90	64	155	82	327
Total	1077	315	189	605	157	1077
PM PEAK						
In						
Work	56	17	9	34	6	56
Non-work	102	28	20	43	26	102
Total In	158	45	29	82	31	158
Out						
Work	719	216	120	431	72	719
Non-work	128	35	25	61	32	128
Total Out	847	251	145	492	104	847
Total						
Work	775	233	129	465	78	775
Non-work	230	63	45	109	58	230
Total	1005	296	174	574	135	1005
SATURDAY TOTAL						
Work	1102	331	184	661	110	1102
Non-Work	122	34	24	58	31	122
Total	1224	364	208	719	141	1224
SATURDAY PEAK						
In						
Work	61	18	10	37	6	61
Non-work	5	1	1	2	1	5
Total In	66	20	11	39	7	66
Out						
Work	51	15	9	31	5	51
Non-work	5	1	1	2	1	5
Total Out	56	17	9	33	6	56
Total						
Work	112	34	19	67	11	112
Non-work	10	3	2	5	3	10
Total	122	36	21	72	14	122

RETAIL:

		MODE SPLIT				
		AUTO		TRANSIT	WALK/ OTHER	
	TOTAL	Persons	Cars			Check
TOTAL ADT:						
Work	205	62	44	123	21	205
Non-Work	1501	413	217	488	600	1501
Total	1706	474	261	611	621	1706
AM PEAK						
In						
Work	15	5	3	9	2	15
Non-Work	10	3	1	3	4	10
Total In:	25	7	5	12	6	25
Out						
Work	0	0	0	0	0	0
Non-work	11	3	2	4	4	11
Total Out:	11	3	2	4	4	11
Total						
Work	15	5	3	9	2	15
Non-work	21	6	3	7	8	21
Total	36	10	6	16	10	36
PM PEAK						
In						
Work	14	4	3	8	1	14
Non-work	57	16	8	19	23	57
Total In	71	20	11	27	24	71
Out						
Work	16	5	3	10	2	16
Non-work	64	18	9	21	26	64
Total Out	80	22	13	30	27	80
Total						
Work	30	9	6	18	3	30
Non-work	121	33	18	39	48	121
Total	151	42	24	57	51	151
SATURDAY TOTAL						
Work	253	76	54	152	25	253
Non-Work	1858	511	269	604	743	1858
Total	2111	587	323	756	769	2111
SATURDAY PEAK						
In						
Work	5	2	1	3	1	5
Non-work	95	26	14	31	38	95
Total In	100	28	15	34	39	100
Out						
Work	5	2	1	3	1	5
Non-work	91	25	13	30	36	91
Total Out	96	27	14	33	37	96
Total						
Work	10	3	2	6	1	10
Non-work	186	51	27	60	74	186
Total	196	54	29	66	75	196

HOTEL

		MODE SPLIT				
		AUTO		TRANSIT	WALK/ OTHER	
	TOTAL	Persons	Cars			Check
TOTAL ADT:						
Work	774	232	166	464	77	774
Non-Work	4389	2414	1271	878	1097	4389
Total	5163	2646	1436	1342	1175	5163
AM PEAK						
In						
Work	27	8	6	16	3	27
Non-Work	234	129	68	47	59	234
Total In:	261	137	74	63	61	261
Out						
Work	0	0	0	0	0	0
Non-work	135	74	39	27	34	135
Total Out:	135	74	39	27	34	135
Total						
Work	27	8	6	16	3	27
Non-work	369	203	107	74	92	369
Total	396	211	113	90	95	396
PM PEAK						
In						
Work	0	0	0	0	0	0
Non-work	210	116	61	42	53	210
Total In	210	116	61	42	53	210
Out						
Work	15	5	3	9	2	15
Non-work	162	89	47	32	41	162
Total Out	177	94	50	41	42	177
Total						
Work	15	5	3	9	2	15
Non-work	372	205	108	74	93	372
Total	387	209	111	83	95	387
SATURDAY TOTAL						
Work	582	175	125	349	58	582
Non-Work	3309	1820	958	662	827	3309
Total	3891	1995	1083	1011	885	3891
SATURDAY PEAK						
In						
Work	0	0	0	0	0	0
Non-work	171	94	50	34	43	171
Total In	171	94	50	34	43	171
Out						
Work	12	4	3	7	1	12
Non-work	123	68	36	25	31	123
Total Out	135	71	38	32	32	135
Total						
Work	12	4	3	7	1	12
Non-work	294	162	85	59	74	294
Total	306	165	88	66	75	306

TOTAL

		MODE SPLIT			WALK/	
		AUTO		TRANSIT	OTHER	
	TOTAL	Persons	Cars			Check
TOTAL ADT:						
Work	4972	1492	875	2983	497	4972
Non-Work	8042	3419	1910	2388	2236	8042
Total	13014	4910	2786	5371	2733	13014
AM PEAK						
In						
Work	792	238	134	475	79	792
Non-Work	433	183	106	140	110	433
Total In:	1225	421	240	615	189	1225
Out						
Work	0	0	0	0	0	0
Non-work	284	115	68	96	73	284
Total Out:	284	115	68	96	73	284
Total						
Work	792	238	134	475	79	792
Non-work	717	299	174	236	182	717
Total	1509	536	308	711	262	1509
PM PEAK						
In						
Work	70	21	12	42	7	70
Non-work	369	159	89	109	101	369
Total In	439	180	101	151	108	439
Out						
Work	750	225	126	450	75	750
Non-work	354	142	81	114	98	354
Total Out	1104	367	208	564	173	1104
Total						
Work	820	246	139	492	82	820
Non-work	723	301	170	223	199	723
Total	1543	547	309	715	281	1543
SATURDAY TOTAL						
Work	1937	581	363	1162	194	1937
Non-Work	5289	2364	1251	1324	1601	5289
Total	7226	2946	1613	2486	1795	7226
SATURDAY PEAK						
In						
Work	66	20	11	40	7	66
Non-work	271	122	64	67	82	271
Total In	337	141	75	107	89	337
Out						
Work	68	20	12	41	7	68
Non-work	219	94	50	57	68	219
Total Out	287	114	62	97	75	287
Total						
Work	134	40	23	80	13	134
Non-work	490	216	114	124	150	490
Total	624	256	137	204	164	624

TRIP GENERATION SUMMARY BY ALTERNATIVE
FOR KINGSTON/BEDFORD GARAGE DEIR
DATE OF UPDATE:OCTOBER 3, 1988

			ALTERNATIVE:		K-B-E BUILD ALTERNATIVE: DEVELOPER'S PROPOSAL				
PERSON TRIP RATES:			USES:			TRIPS BY USE:			
	OFFICE	RETAIL	HOTEL	OTHER	OFFICE	RETAIL	HOTEL	OTHER	TOTAL
Unit	000 sf	000 sf	rooms	000 sf	892.00	54.00	0	7.00	
TOTAL ADT:									
Work	6.81	6.82			6075	368	0	0	6443
Non-Work	3.67	50.03			3274	2702	0	0	5976
Total	10.48	56.85			9348	3070	0	0	12418
AM PEAK									
In									
Work	1.36	0.51			1213	28	0	0	1241
Non-Work	0.34	0.33			303	18	0	0	321
Total In:	1.70	0.84			1516	45	0	0	1561
Out									
Work	0.00	0.00			0	0	0	0	0
Non-work	0.25	0.35			223	19	0	0	242
Total Out:	0.25	0.35			223	19	0	0	242
Total									
Work	1.36	0.51			1213	28	0	0	1241
Non-work	0.59	0.68			526	37	0	0	563
Total	1.95	1.19			1739	64	0	0	1803
PM PEAK									
In									
Work	0.10	0.47			89	25	0	0	114
Non-work	0.19	1.89			169	102	0	0	271
Total In	0.29	2.36			259	127	0	0	386
Out									
Work	1.28	0.53			1142	29	0	0	1171
Non-work	0.23	2.13			205	115	0	0	320
Total Out	1.51	2.66			1347	144	0	0	1491
Total									
Work	1.38	1.00			1231	54	0	0	1285
Non-work	0.41	4.02			366	217	0	0	583
Total	1.79	5.02			1597	271	0	0	1868
SATURDAY TOTAL									
Work	2.04	8.44			1820	456	0	0	2276
Non-Work	0.23	61.93			205	3344	0	0	3549
Total	2.27	70.37			2025	3800	0	0	5825
SATURDAY PEAK									
In									
Work	0.09	0.17			80	9	0	0	89
Non-work	0.01	3.16			9	171	0	0	180
Total In	0.10	3.33			89	180	0	0	269
Out									
Work	0.08	0.16			71	9	0	0	80
Non-work	0.01	3.04			9	164	0	0	173
Total Out	0.09	3.20			80	173	0	0	253
Total									
Work	0.17	0.33			152	18	0	0	170
Non-work	0.02	6.20			18	335	0	0	353
Total	0.19	6.53			169	353	0	0	522

MODE SPLIT SUMMARY BY ALTERNATIVE
FOR KINGSTON/BEDFORD DEIR
DATE OF UPDATE: OCTOBER 17, 1988
ALTERNATIVE: K-B-E DEVELOPER'S PROPOSAL

OFFICE:

		MODE SPLIT			WALK/	
		AUTO		TRANSIT	OTHER	
	TOTAL	Persons	Cars			Check
TOTAL ADT:						
Work	6075	1823	1013	3645	608	6075
Non-Work	3274	900	643	1555	819	3274
Total	9349	2723	1656	5200	1426	9349
AM PEAK						
In						
Work	1213	364	202	728	121	1213
Non-Work	303	83	60	144	76	303
Total In:	1516	447	262	872	197	1516
Out						
Work	0	0	0	0	0	0
Non-work	223	61	44	106	56	223
Total Out:	223	61	44	106	56	223
Total						
Work	1213	364	202	728	121	1213
Non-work	526	145	103	250	132	526
Total	1739	509	305	978	253	1739
PM PEAK						
In						
Work	89	27	15	53	9	89
Non-work	169	46	33	80	42	169
Total In	258	73	48	134	51	258
Out						
Work	1142	343	190	685	114	1142
Non-work	205	56	40	97	51	205
Total Out	1347	399	231	783	165	1347
Total						
Work	1231	369	205	739	123	1231
Non-work	374	103	73	178	94	374
Total	1605	472	279	916	217	1605
SATURDAY TOTAL						
Work	1820	546	303	1092	182	1820
Non-Work	205	56	40	97	51	205
Total	2025	602	344	1189	233	2025
SATURDAY PEAK						
In						
Work	80	24	13	48	8	80
Non-work	9	2	2	4	2	9
Total In	89	26	15	52	10	89
Out						
Work	71	21	12	43	7	71
Non-work	9	2	2	4	2	9
Total Out	80	24	14	47	9	80
Total						
Work	151	45	25	91	15	151
Non-work	18	5	4	9	5	18
Total	169	50	29	99	20	169

RETAIL:

		MODE SPLIT				
		AUTO		TRANSIT	WALK/ OTHER	
	TOTAL	Persons	Cars			Check
TOTAL ADT:						
Work	368	110	79	221	37	368
Non-Work	2702	743	391	878	1081	2702
Total	3070	853	470	1099	1118	3070
AM PEAK						
In						
Work	28	8	6	17	3	28
Non-Work	18	5	3	6	7	18
Total In:	46	13	9	23	10	46
Out						
Work	0	0	0	0	0	0
Non-work	19	5	3	6	8	19
Total Out:	19	5	3	6	8	19
Total						
Work	28	8	6	17	3	28
Non-work	37	10	5	12	15	37
Total	65	19	11	29	18	65
PM PEAK						
In						
Work	25	8	5	15	3	25
Non-work	102	28	15	33	41	102
Total In	127	36	20	48	43	127
Out						
Work	29	9	6	17	3	29
Non-work	115	32	17	37	46	115
Total Out	144	40	23	55	49	144
Total						
Work	54	16	12	32	5	54
Non-work	217	60	31	71	87	217
Total	271	76	43	103	92	271
SATURDAY TOTAL						
Work	456	137	98	274	46	456
Non-Work	3344	920	484	1087	1338	3344
Total	3800	1056	582	1360	1383	3800
SATURDAY PEAK						
In						
Work	9	3	2	5	1	9
Non-work	171	47	25	56	68	171
Total In	180	50	27	61	69	180
Out						
Work	9	3	2	5	1	9
Non-work	164	45	24	53	66	164
Total Out	173	48	26	59	67	173
Total						
Work	18	5	4	11	2	18
Non-work	335	92	48	109	134	335
Total	353	98	52	120	136	353

TOTAL

			MODE SPLIT		WALK/	
		AUTO		TRANSIT	OTHER	
	TOTAL	Persons	Cars			Check
TOTAL ADT:						
Work	6443	1933	1091	3866	644	6443
Non-Work	5976	1643	1034	2433	1899	5976
Total	12419	3576	2126	6299	2544	12419
AM PEAK						
In						
Work	1241	372	208	745	124	1241
Non-Work	321	88	62	150	83	321
Total In:	1562	461	270	894	207	1562
Out						
Work	0	0	0	0	0	0
Non-work	242	67	47	112	63	242
Total Out:	242	67	47	112	63	242
Total						
Work	1241	372	208	745	124	1241
Non-work	563	155	109	262	146	563
Total	1804	527	317	1006	270	1804
PM PEAK						
In						
Work	114	34	20	68	11	114
Non-work	271	75	48	113	83	271
Total In	385	109	68	182	94	385
Out						
Work	1171	351	197	703	117	1171
Non-work	320	88	57	135	97	320
Total Out	1491	439	253	837	214	1491
Total						
Work	1285	385	217	771	129	1285
Non-work	591	163	105	248	180	591
Total	1876	548	322	1019	309	1876
SATURDAY TOTAL						
Work	2276	683	401	1366	228	2276
Non-Work	3549	976	524	1184	1389	3549
Total	5825	1659	925	2550	1616	5825
SATURDAY PEAK						
In						
Work	89	27	15	53	9	89
Non-work	180	50	27	60	71	180
Total In	269	76	42	113	80	269
Out						
Work	80	24	14	48	8	80
Non-work	173	48	26	58	68	173
Total Out	253	72	39	106	76	253
Total						
Work	169	51	29	101	17	169
Non-work	353	97	52	117	139	353
Total	522	148	81	219	155	522

APPENDIX B-6

MBTA CORRESPONDENCE REGARDING PROPOSED ESSEX STREET TUNNEL

MASSACHUSETTS
BAY
TRANSPORTATION
AUTHORITY

~~Ten Park Plaza, Boston, MA 02116~~
ONE SOUTH STATION
BOSTON, MA 02110

October 12, 1988

Ms. Pamela Wessling
Boston Redevelopment Authority
Boston City Hall
Boston, MA 02201

Dear Ms. Wessling:

The MBTA is conducting an Alternative Analysis/Draft Environmental Impact Report for the South Boston Transit Study. Our consultants, URS Consultants, Inc., and I recently met with Axel Kaufman of Jung/Brannen to discuss the Kingston-Bedford development project and our Alternative 4.

As a result of this meeting, a number of issues surfaced relative to the proximity of our proposed transit tunnel and their proposed underground parking structure. I have enclosed a graphic and a brief description of our alignment which demonstrates the impact of their structure under Essex Street on our transit tunnel.

We hope to be able to work with the BRA and the developer to achieve a mutually workable solution to this issue. Toward that end, I have instructed URS to include the proposed development and coordination of this issue in our DEIR. I would like to suggest that you include our transit alignment as a coordinating issue in the Kingston-Bedford DEIR.

Please advise if you have any comments on this issue or call me if I can be of any assistance in this matter. Thank-you.

Sincerely,

Joseph C. Aiello

Joseph C. Aiello
Senior Project Manager

GVH/db

attachment

cc: D. J. Pizzella
M. Cutler, URS

UNDERGROUND PEOPLE MOVER/LIGHT RAIL/BUS ALTERNATIVE ALONG ESSEX STREET AT METROPOLITAN/COLUMBIA PLAZA VENTURE DEVELOPMENT AT KINGSTON & BEDFORD STREETS

The above development is located between Kingston Street and the Central Artery on the north side of Essex Street as shown on Figure 1. The development consists of a multi-story building with five levels of parking which extends out under Essex Street as shown on Figure 2.

The Underground People Mover/Light Rail/Bus alternative occupies 50' of Essex Street as shown on Figures 1 and 2 and the top of the tunnel is approximately 50' - 55' in depth from the surface. As shown on Figure 2, there appears to be a conflict with the fifth parking level and the northern most tunnel tube. The tunnel construction in this area is currently proposed to be mined by machine because of its depth.

Due to the apparent conflict of the parking garage and the transit tunnel, it is suggested that it be presented in EIR documents for both projects with the intention that the conflict be resolve to mutual satisfaction in the design stages.

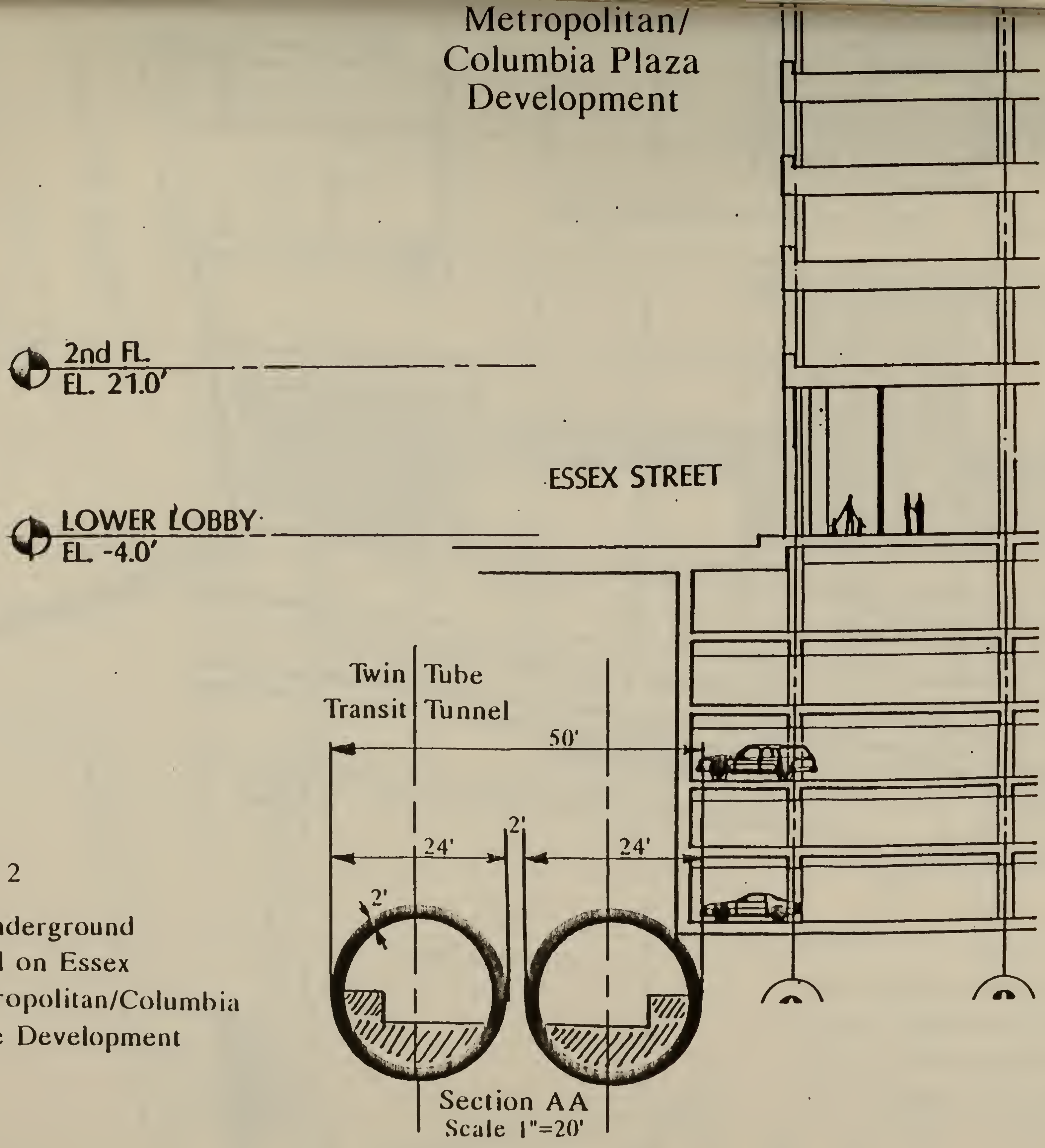

Figure 2

Section of Underground Transit Tunnel on Essex Street at Metropolitan/Columbia Plaza Venture Development

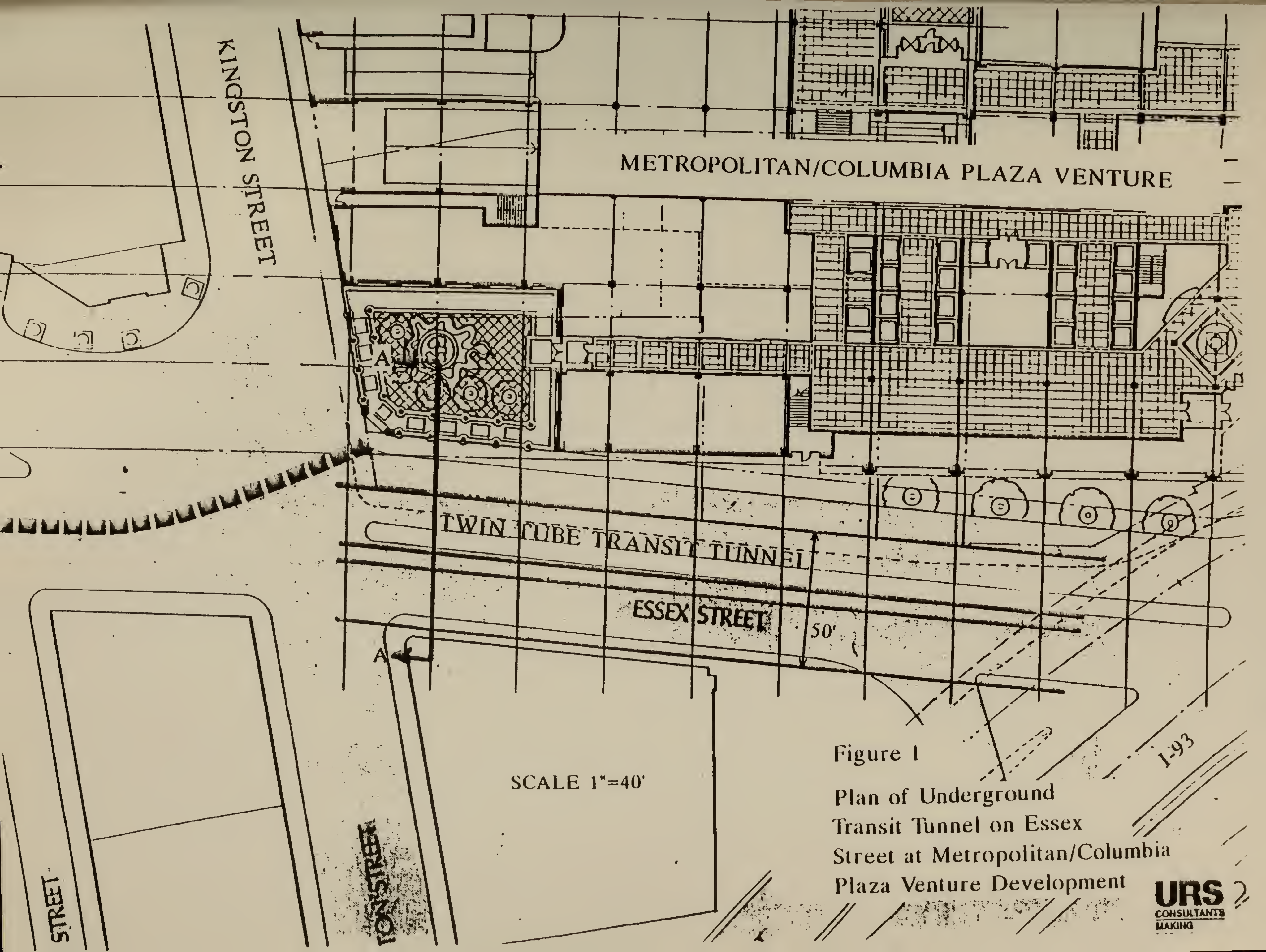

Figure 1

Plan of Underground Transit Tunnel on Essex Street at Metropolitan/Columbia Plaza Venture Development

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